

Engineering Design File

Project No. 23927

Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project and the Accelerated Retrieval Project II

**Idaho
Cleanup
Project**

The Idaho Cleanup Project is operated for the
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EDF No.: 5307 EDF Rev. No.: 1 Project No.: 23927

1. Title: Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project and the Accelerated Retrieval Project II

2. Index Codes:
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5. Summary:
The Radioactive Waste Management Complex at the Idaho National Laboratory Site was used for subsurface disposal of transuranic waste in various pits and trenches of the Subsurface Disposal Area from 1952 until 1970, when the practice was suspended in favor of aboveground, retrievable storage. Low-level waste from the Idaho National Laboratory and elsewhere was also disposed of in these pits and trenches. As part of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq., 1980) non-time-critical removal action (NTCRA), the U.S. Department of Energy proposes to retrieve some of this waste in the Subsurface Disposal Area. The Accelerated Retrieval Project intends to retrieve and process waste from a designated area in Pit 4 within the Radioactive Waste Management Complex as the area to be remediated under this NTCRA. The Accelerated Retrieval Project II, also a CERCLA NTCRA, will retrieve similar waste from a portion of Pit 4 and Pit 6. The focused objective of both projects is targeted retrieval of certain Rocky Flats Plant waste streams that are highly contaminated with transuranic radionuclides, volatile organic compounds, and isotopes of uranium. To achieve this objective, Accelerated Retrieval Project (ARP) I and ARP II target removal of only the following Rocky Flats Plant waste streams: Series 741 and 743 sludge; graphite; filters; and roaster oxide waste.

As part of the retrieval process, it is necessary to consider the range of possible chemical combinations that could occur during excavation, repackaging, and storage. The potential adverse chemical reactions (e.g., generation of fire, explosion, heat, or fumes) that stem from combining chemicals at ambient temperatures need to be considered to support safe and compliant onsite waste management. The study in this engineering design file (EDF) investigates the possibility of adverse chemical reactions that could occur during ARP I and ARP II excavation, repackaging, or storage. Revision 0 of this EDF documented the evaluation of chemical compatibility for the ARP I area only and was based on the draft report, *Central Characterization Project Acceptable Knowledge Summary Report for a Described Area in Pit 4 at the Idaho National Engineering and Environmental Laboratory*. Revision 1 of this EDF is based on the current revision (Revision 2) of the acceptable knowledge summary report, *Central Characterization Project Acceptable Knowledge Summary Report for A Described Area in Pit 4 at the Idaho National Laboratory, Transuranic Waste Streams ID-SDA-PIT4-DEBRIS, ID-SDA-PIT4 sludge, ID-SDA-PIT4-SOIL (CCP 2005)*, and addresses the modified chemical inventory in that report. The purpose of this revision is to document the chemical inventory within wastes buried in the ARP I and ARP II designated retrieval areas and to document evaluation of the chemical compatibility of the buried wastes.

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ACRONYMS

AK	acceptable knowledge
ANL	Argonne National Laboratory
ANL-W	Argonne National Laboratory-West
ARA	Auxiliary Reactor Area
ARP	Accelerated Retrieval Project
CFA	Central Facilities Area
CPP	Chemical Processing Plant
DOW	Dow Chemical
EDF	Engineering Design File
EPA	Environmental Protection Agency
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
NRF	Naval Reactors Facility
NTCRA	non-time-critical removal action
PER	Power Excursion Reactor
RFO	Rocky Flats Operation
RFP	Rocky Flats Plant
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
TAN	Test Area North
TRA	Test Reactor Area
TRU	transuranic
VOC	volatile organic compound

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Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project and the Accelerated Retrieval Project II

1. INTRODUCTION

The Radioactive Waste Management Complex (RWMC) at the Idaho National Laboratory (INL) Site (Figure 1) was used for subsurface disposal of transuranic (TRU) waste in various pits and trenches of the Subsurface Disposal Area (SDA) from 1952 until 1970, when the practice was suspended in favor of aboveground, retrievable storage. Low-level waste from the INL Site and elsewhere was also disposed of in these pits and trenches. As part of a Comprehensive Environmental Response, Compensation, and Liability Act (42 USC § 9601 et seq., 1980) non-time-critical removal action (NTCRA), the U.S. Department of Energy proposes to retrieve some of this waste in the SDA. The Accelerated Retrieval Project (ARP) I intends to retrieve and process waste from a designated area in Pit 4 of the SDA within the Radioactive Waste Management Complex as the area to be remediated under this NTCRA. The Accelerated Retrieval Project II, also a CERCLA NTCRA, will retrieve similar waste from a portion of Pit 4 and Pit 6. The focused objective of the ARP I and ARP II projects is targeted retrieval of certain Rocky Flats Plant waste streams that are highly contaminated with transuranic (TRU) radionuclides, volatile organic compounds (VOCs), and isotopes of uranium. To achieve this objective, ARP I and ARP II target removal of only the following Rocky Flats Plant waste streams: Series 741 and 743 sludge; graphite; filters; and roaster oxide waste.

As part of the retrieval process, it is necessary to consider the range of possible chemical combinations that could occur during excavation, repackaging, and storage. The potential adverse chemical reactions (e.g., generation of fire, explosion, heat, or fumes) that stem from combining chemicals at ambient temperatures need to be considered to support safe and compliant onsite waste management. The study in this engineering design file (EDF) investigates the possibility of adverse chemical reactions that could occur during ARP I and ARP II excavation, repackaging, or storage. Revision 0 of this EDF documented the evaluation of chemical compatibility for the ARP I area only and was based on the draft report, *Central Characterization Project Acceptable Knowledge Summary Report for A Described Area in Pit 4 at the Idaho National Engineering and Environmental Laboratory*. Revision 1 of this EDF is based on the current revision (Revision 2) of the acceptable knowledge (AK) summary report, *Central Characterization Project Acceptable Knowledge Summary Report for A Described Area in Pit 4 at the Idaho National Laboratory, Transuranic Waste Streams ID-SDA-PIT4-DEBRIS, ID-SDA-PIT4 sludge, ID-SDA-PIT4-SOIL* (CCP 2005), and addresses the modified chemical inventory in the AK summary report. The purpose of this revision is to document the chemical inventory within wastes buried in the ARP I and ARP II designated retrieval areas and to document evaluation of the chemical compatibility of the buried wastes. The assessment did not include evaluation of construction or equipment material compatibility issues that may occur from exposure to chemicals in the waste. This scope is addressed in separate design documentation.

2. BACKGROUND

The following sections provide historical background of the SDA and waste disposed of in Pit 4 and Pit 6. The *Engineering Evaluation/Cost Analysis for the Accelerated Retrieval of a Designated Portion of Pit 4* (DOE-ID 2004a) contains further background of the operational history of the RWMC and the INL.

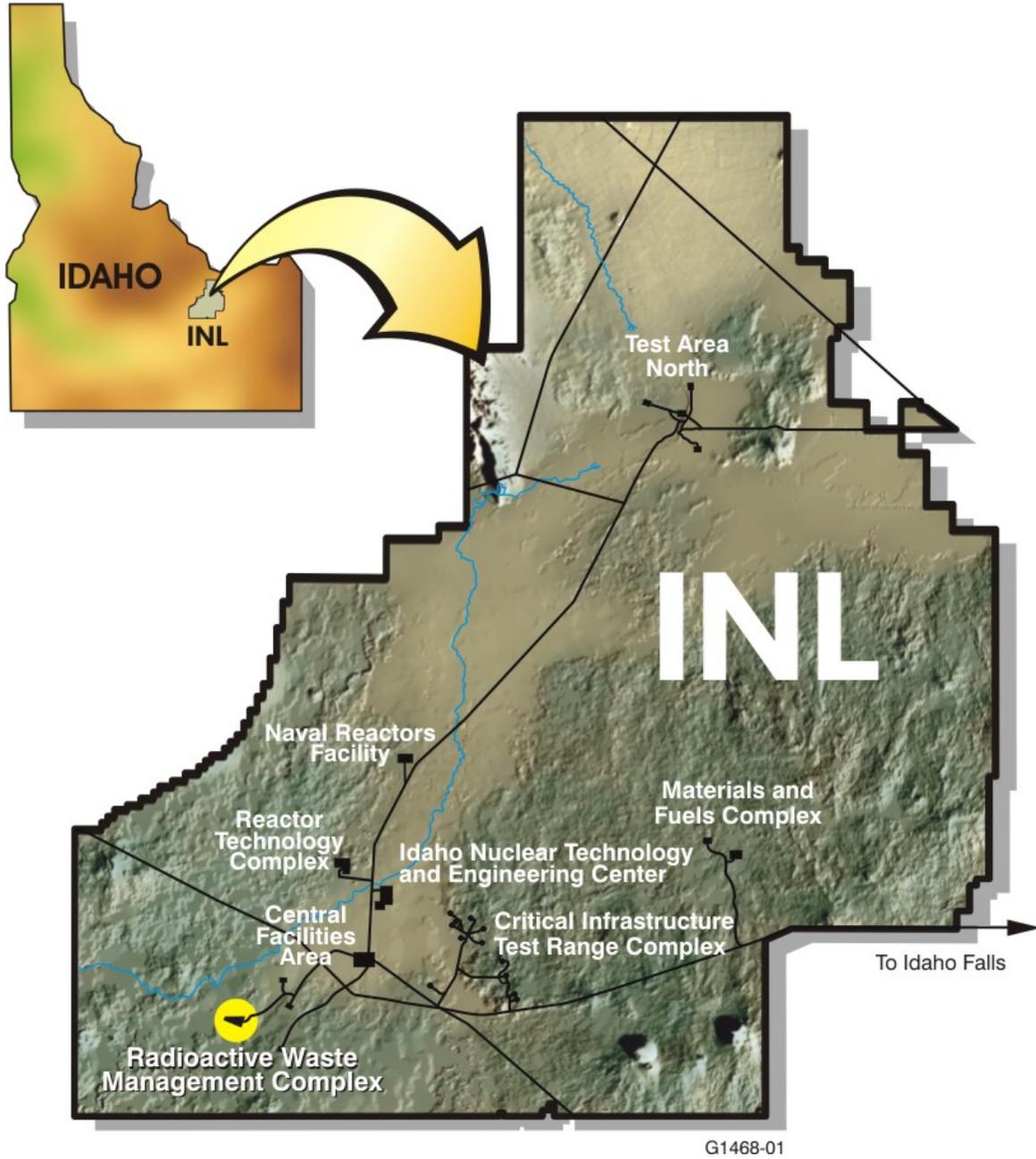


Figure 1. Map of the Idaho National Laboratory showing locations of the Radioactive Waste Management Complex and other major facilities.

2.1 Subsurface Disposal Area and Operations

Currently, the RWMC covers 71.6 ha (177 acres) in the southwestern quadrant of the INL Site. This includes the administration area of approximately 8.9 ha (22 acres), the SDA, and the TSA (established in 1970 at 23.3 ha [58 acres]). Figure 2 provides a map of the RWMC showing the location of pits, trenches, and soil vaults in the SDA. Pit 4 is located in the approximate center of the SDA. Pit 6 is located just east of Pit 4. In 1952, the SDA was established at 5.26 ha (13 acres) for disposal of solid radioactive waste. Burial of defense waste with TRU elements from the Rocky Flats Plant (RFP) began in 1954. By 1957, the original SDA was nearly full. In 1958, the SDA was expanded to 35.6 ha (88 acres), which remained the same until 1988 when the security fence was relocated outside the dike surrounding the SDA and the current size of 39.3 ha (97 acres) was established. Approximately 62 of the total 97 acres are open areas that do not contain waste (e.g., area between pits and trenches and dikes surrounding the entire landfill).

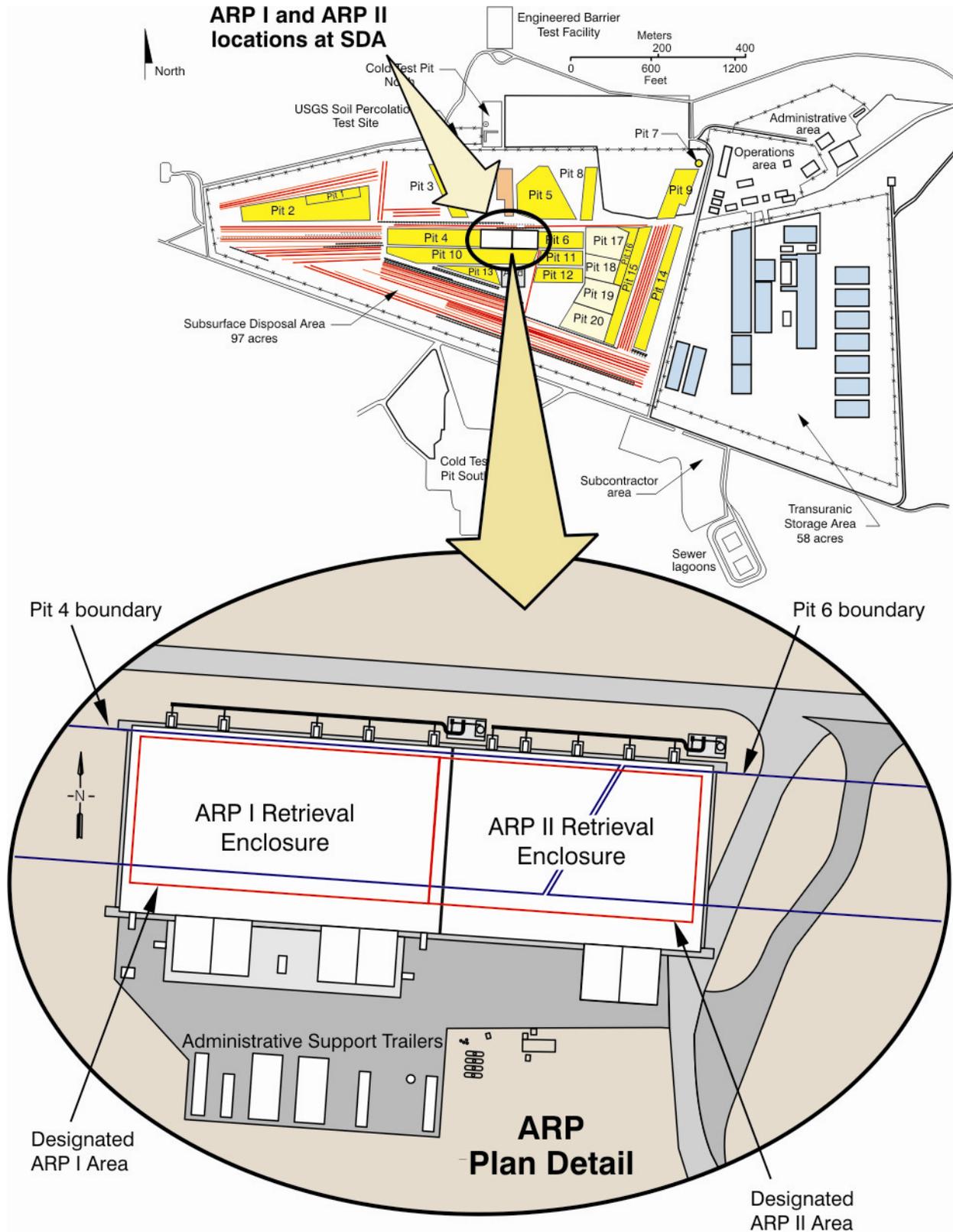
From 1952 to 1970, radioactive waste was buried in pits, trenches, and soil vault rows excavated into a veneer of surficial sediment. This sediment is underlain by a thick series of basaltic lava intercalated with sedimentary deposits. In 1970, the shallow burial of TRU waste ended and burial of other radioactive waste has continued. Since 1970, TRU waste has been stored on aboveground asphalt pads in retrievable containers. Since 1985, waste disposal in the SDA has been limited to low-level radioactive waste from INL Site operations. Between 1952 and 1997, approximately 215,000 m³ (281,209.4 yd³) of radioactive waste containing about 12.6 million Ci of radioactivity was buried at the SDA (French and Taylor 1998). A 1998 inventory of amounts of 38 radioactive buried contaminants (Becker et al. 1998) was updated in 2002 for 25 radionuclides in the *Ancillary Basis for Risk Analysis of the Subsurface Disposal Area* (Holdren et al. 2002).

Between 1960 and 1963, the RWMC accepted radioactive waste from private sources such as universities, hospitals, and research institutes. This service stopped in September 1963 when commercial burial sites became available for contaminated waste from private industry. When the TSA became operational, asphalt pads were constructed on which TRU waste was stacked and then covered with plywood, plastic sheeting, and 1 m (3 ft) of soil. From 1975 to 1996, air-support buildings were used to protect recently received waste containers during stacking operations. These support structures were emptied in 1996 and decommissioned in 1998.

In the fall of 1988, the INL Site stopped receiving shipments of TRU waste to the RWMC from out-of-state sources.

2.2 Pit 4 and Pit 6 Background

Pit 4 was open to receive waste from January 1963 through September 1967. Pit 6 was opened later, receiving waste from May 1967 through October 1968. Based on the timeframe of burial in the designated portions of Pits 4 and 6, RFP waste within the designated retrieval areas was primarily dumped rather than stacked. Additional waste from INL waste generators and some waste from off-INL generators also were buried in the pit. In the 1960s, the disposal process involved excavating an area in the SDA with tractor-drawn scrapers down to underlying basalt outcroppings, then backfilling and leveling the newly constructed pit floor with a layer of native soil approximately 0.6-m (2-ft) thick. The majority of the waste was placed in drums; cardboard, wood, and metal boxes; and other containers, and was then buried. Soil sometimes was added as an interim step when waste was being emplaced and while the pits remained open. After a large area was full, pits were backfilled and initially covered with about 1 m (3 ft) of soil, commonly referred to as overburden soil. Additional overburden soil was added, over time, to repair subsidence and promote surface drainage. The estimated overburden thickness currently over Pits 4 and 6 ranges from 1.2 to 2.1 m (4 to 7 ft).



G06-1733-01

Figure 2. Accelerated Retrieval Project area within the Subsurface Disposal Area.

After approximately 40 years of burial, original disposal containers, including the carbon steel drums, were expected to be significantly corroded and degraded similar to drums removed from Pit 9 in early 2004 by the OU 7-10 Glovebox Excavator Method Project (DOE-ID 2004a). However, initial retrieval experience under ARP I has shown that the drums may be in significantly better condition than those retrieved from Pit 9. Many drums uncovered in the initial retrieval area in Pit 4 (during ARP I) are relatively intact.

Table 1 presents a summarized listing of the primary RFP waste types, characteristics, and volumes in the ARP I and ARP II areas. The table is included to provide general background on the composition of the waste types being assessed for chemical compatibility. For detailed information on the waste streams in the ARP I and ARP II areas, and the processes that generated the wastes, refer to the current version of the AK summary report (CCP 2005). The summary characteristics column in Table 1 shows that the RFP waste forms contain various radiological and nonradiological contaminants. The material shipped to Pit 4 and Pit 6 from RFP included weapons-grade plutonium, Am-241, and uranium isotopes. Weapons-grade plutonium contains Pu-238, Pu-239, Pu-240, Pu-241, and Pu-242. In addition, some Am-241 and Np-237 are daughters resulting from the radioactive decay of Pu-241. Also included in the waste shipments was additional Am-241. This Am-241 did not result from the decay of Pit 4 or Pit 6 inventory, but was removed from weapons-grade plutonium during processing at RFP. This additional Am-241 is a significant contributor to the total radioactivity located in Pit 4 and Pit 6. Uranium isotopes shipped to the RWMC included U-235 and U-238. A number of radionuclides, including Co-60, Cs-137, Sr-90, Y-90, and Ba-137, that originated primarily from INL Site waste generators, may also be found in Pit 4 and Pit 6.

The primary chemicals known to be in Pit 4 and Pit 6 are presented in Appendix B based on information associated with the AK summary report, Revision 2 (CCP 2005), prepared for the ARP I and ARP II. Section 3 presents assessment of the chemical compatibility considerations associated with the chemicals in Appendix B, and subsection 3.2.1 discusses modifications to the chemical inventory based on Revision 2 of the AK Summary report.

2.3 Designated Area Definition

A study was conducted, as part of the Pit 9 Stage III Project, to evaluate and prioritize various areas of the SDA for possible removal of TRU contamination and hazardous VOCs. These were evaluated against a number of criteria (e.g., total TRU content, total VOC content, and accessibility). The designated portion of Pit 4 was selected because it contains high concentrations of TRU waste and also contains significant volumes of other targeted waste forms, including VOCs and uranium. The approximate 1/2-acre size was selected based on the estimated distribution of waste in the pit and other engineering factors (e.g., economies of scale associated with retrieval). The retrieval area of focus comprises approximately 21% of the overall area of Pit 4 with approximate dimensions of 38.4 × 80.2 m (126 × 263 ft). The ARP II area, also shown in Figure 2, was selected based upon similar criteria as is further discussed in the project Action Memorandum (DOE-ID 2004b).

Table 1. Summary of RFP waste content in the ARP I and ARP II retrieval areas of Pit 4 and Pit 6 within the SDA.

Waste Type	Summary Characteristics	Packaging	ARP I and II Estimated Waste Volume (ft ³) (CCP 2005)
Series 741 first-stage sludge	Salt precipitate containing plutonium and americium oxides, depleted uranium, metal oxides, and organic constituents.	18.1 to 22.7 kg (40 to 50 lb) of Portland cement added to top and bottom of drum to absorb any free liquids. Encased in one or more plastic bags.	11,837
Series 742 second-stage sludge	Salt precipitate containing plutonium and americium oxides, metal oxides, and organic constituents.	18.1 to 22.7 kg (40 to 50 lb) of Portland cement added in layers to absorb any free liquids. Encased in one or more plastic bags.	16,271
Series 743 sludge organic setups	Organic liquid waste solidified using calcium silicate (pastelike or greaselike).	136.8 L (36 gal) of organic waste mixed with 54.5 kg (120 lb) calcium silicate. Small quantities (4.5 to 9.1 kg [10 to 20 lb]) of Oil-Dri added to top and bottom, if necessary. Encased in one or more plastic bags.	33,815
Series 744 sludge special setups	Complexing chemicals (liquids) including Versenes, organic acids, and alcohols solidified with cement.	86.2 kg (190 lb) of Portland cement and 22.7 kg (50 lb) of magnesia cement in drum followed by the addition of 99.9 L (26.4 gal) of liquid waste. Additional cement added to the top and bottom. Encased in one or more plastic bags.	3,601
Series 745 sludge evaporator salts	Nitrate salt residues from solar evaporation ponds at RFP. Note – Series 745 Sludge is limited to the ARP II area.	Salt residue packaged in plastic bag and drum. Cement added to damp or wet salt, when necessary	11,934

Table 1. (continued).

Waste Type	Summary Characteristics	Packaging	ARP I and II Estimated Waste Volume (ft ³) (CCP 2005)
Combustible, noncombustible, and mixed debris	Solid radioactively contaminated combustible debris items such as paper, rags, cardboard, and wood. Noncombustible debris varies widely including pipe, empty drums, glass, and sand. Some waste is contaminated with beryllium metal.	Varies by process line generating the waste. Waste may have been wrapped in plastic or placed directly into the waste container.	168,795
Roaster oxide waste	Incinerated depleted uranium. Primary chemical form is uranium oxide with some metal possible.	Packaged in metal drums with inner plastic bag packaging.	2,524
Graphite	Graphite mold pieces after excess plutonium removal. Molds are broken into large pieces before packaging. Graphite fines (e.g., scarfings) packaged in small bottles.	Drums lined with polyethylene bags and, most likely, a cardboard liner. Bottles of graphite fines were individually wrapped in plastic bags.	1,515
Filters	Discarded high-efficiency particulate air filters contaminated with RFP radionuclides such as plutonium and americium.	Packaged in cardboard cartons and boxes depending on the timeframe of disposal.	18,613

2.4 Data Sources

The draft AK summary report, titled *Central Characterization Project Acceptable Knowledge Summary Report for A Described Area in Pit 4 at the Idaho National Engineering and Environmental Laboratory*, was used as the primary source of process knowledge and chemical inventory information in Revision 0 of this EDF. Since that time, the AK summary report has been finalized and is currently Revision 2 (CCP 2005). The AK documentation and associated references provide detailed information relating to facility histories and process operations. AK information is obtained from numerous sources including facility safety basis documentation, facility procedures, generator and storage facility waste records, and interviews with cognizant personnel. A series of working meetings were held between the authors of this EDF, other BBWI support personnel, and the AK document preparers to develop and document an appropriate chemical inventory for analysis in Revision 0 of this EDF.

The purpose of this revision is to perform the required chemical compatibility evaluation for changes to the chemical inventory that have been introduced through Revision 2 of the AK summary report (CCP 2005). Revision 2 addresses updates to the inventory associated with the ARP I area as well as any additions for the ARP II area. Note that the waste streams in the areas are very similar and therefore the changes are quite limited. The most notable addition to the inventory of wastes is the presence of Series 745 sludge that comprises nitrate salt residues from solar evaporation ponds at RFP. The resulting assessment is documented in Section 3.2.1 below. Appendix B reflects the current inventory of chemicals and relative quantities in Revision 2 of the AK summary report. The primary reference for the chemicals included in Revision 2 of the AK summary report is the document, *Retrieval Area Chemical Evaluation and RCRA Hazards Analysis* (ID-C101 2006). ID-C101 includes the most up-to-date listing of chemicals likely to be in the SDA and is the specific reference source for the chemical table presented in Appendix B and evaluated in Section 3 below. It is recommended that project AK personnel be contacted to obtain the most current chemical reference information for the SDA.

A major source of data concerning waste and contaminants disposed in the designated area of Pit 4 and Pit 6 are the waste shipment documents. Each shipment document includes a specific disposal location that enables the identification of what shipments were disposed in the designated area of Pit 4 and Pit 6. Shipment data indicates that waste disposed in the designated area originated from both onsite sources and the RFP.

3. CHEMICAL COMPATIBILITIES

3.1 Purpose

This section presents an evaluation of the potential for incompatible chemical reactions in the waste inventory of the designated retrieval area in Pit 4 and Pit 6 that will be retrieved as part of the ARP I and ARP II. This evaluation considered the range of possible chemical combinations (i.e., binary combinations) that could occur during excavation, repackaging, and storage. The potential adverse chemical reactions (e.g., generation of fire, explosion, heat, or fumes) that stem from combining chemicals at ambient temperatures^a also were considered. This evaluation will support the ARP I and ARP II characterization, and operational decision-making process by identifying chemical combinations that may potentially lead to adverse chemical reactions and affect project compliance and safety. A map

^a Assessment at ambient temperatures is characterized by the normal temperature range associated with expected on-site waste management activities and does not include evaluation of elevated temperature scenarios such as would be expected to result from gas-generation testing or other treatment operations that may be performed on the waste.

showing the location of the RWMC at the INL Site is presented in Figure 1 followed by a map of the SDA showing the location of the designated retrieval area of Pit 4 and 6, provided in Figure 2.

3.2 Summary of Existing Technical Documentation and Evaluation Process

This section provides the technical documentation on which the chemical compatibility evaluation is based. The evaluation follows the methodology for assessing chemical compatibility as presented in the Environmental Protection Agency (EPA) document *A Method for Determining the Compatibility of Hazardous Wastes* (EPA 1980). Consistent with the EPA guidance, the evaluation performed in this EDF evaluates the potential range of all binary combinations of chemicals in the ARP I waste inventory.

Several previous assessments of chemical compatibility have been performed on SDA wastes similar to that in Pit 4 and Pit 6 as part of Pit 9 remediation activities. The evaluations from the report, *Evaluation of Chemical Compatibilities of the OU 7-10 Glovebox Excavator Method Project* (Dick and Burton 2002) are utilized extensively in the analysis presented below, and are extensively quoted, with modifications as required, without further attribution.

A refined chemical compatibility evaluation of contaminants was performed and documented in Dick and Burton (2002). A compatibility study including ternary combinations was considered and then rejected because it would be unwieldy (EPA 1980). Furthermore, the mixtures considered in this analysis would involve solid-state reactions at ambient temperatures and pressures. The formation of a three-membered transition state in solids would be infrequent at best; therefore, reactions requiring three reactants to come together in a reactive intermediate would not be rapid. The possibility of sequential reactions involving three reactants also was considered and similarly evaluated. However, if a metal fire were to significantly heat the reactants, then a different outcome would be possible.

Key definitions are provided below to enhance understanding of the chemical compatibility evaluation. The first three definitions were derived from DOE Manual 440.1-1, "DOE Explosives Safety Manual."

- Explosive: Any chemical compound or mechanical mixture that, when subjected to heat, impact, friction, shock, or other suitable initiation stimulus, undergoes a very rapid chemical change with the evolution of large volumes of highly heated gases that exert pressures in the surrounding medium. The term applies to materials that either detonate or deflagrate. The DOE explosives may be dyed various colors, except pink, which is reserved for mock explosives.
- Deflagration: A rapid chemical reaction in which the output of heat is sufficient to enable the reaction to proceed and be accelerated without input of heat from another source. Deflagration is a surface phenomenon with the reaction products flowing away from the unreacted material along the surface at subsonic velocity. The effect of a true deflagration under confinement is an explosion. Confinement of the reaction increases pressure, rate of reaction, and temperature, and may cause transition into a detonation.
- Detonation: A violent chemical reaction within a chemical compound or mechanical mixture involving heat and pressure. A detonation is a reaction that proceeds through the reacted material toward the unreacted material at a supersonic velocity. The result of the chemical reaction is exertion of extremely high pressure on the surrounding medium, forming a propagating shock wave that is originally of supersonic velocity. When the material is located on or near the surface of the ground, a detonation is normally characterized by a crater.

In the present work, incompatible is defined by both 40 CFR 264.17(b) and EPA (1980). Based on these standards, our definition for this evaluation is as follows:

Incompatible: A mixture of chemicals that can lead to the effects described in 40 CFR 264.17(b) and EPA (1980). Thus, compatible chemicals may react slowly over time, and even generate heat, but will not lead to disastrous effects such as (1) Generate extreme heat or pressure, fire or explosions, or violent reactions, (2) Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment; (3) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions; (4) Damage the structural integrity of the device or facility; (5) Through other like means threaten human health or the environment. Note the use of the terms extreme and uncontrolled, and specification of damage to the structural integrity of the facility.

The issues as discussed in EPA (1980, Section 1, p. 1) are quoted below:

The 'combination of solid wastes' part of the definition often presents problems in many aspects of the management of hazardous waste. In some instances, the combination or mixture of two or more types of the waste produces undesirable or uncontrolled reactions resulting in adverse consequences. These reactions may cause any one or more of the following: (1) heat generation, (2) fire, (3) explosion, (4) formation of toxic fumes, (5) formation of flammable gases, (6) volatilization of toxic or flammable substances, (7) formation of substances of greater toxicity, (8) formation of shock and friction sensitive compounds, (9) pressurization in closed vessels, (10) solubilization of toxic substances, (11) dispersal of toxic dusts, mists, and particles, and (12) violent polymerization. In this report, such reactions are called **incompatible reactions** and the reacting waste is called **incompatible wastes** (emphasis added). Again note the use of the terms uncontrolled reactions and adverse consequences.

In this analysis, incompatible types of waste are to be considered as chemicals that will react to produce heat sufficient to cause a runaway reaction during storage, a fire or explosion, or the liberation of toxic gases at a rate sufficient to constitute a threat to human health or the environment. Insufficient test data exist to preclude all possibility of reactions with long induction periods. It is recognized that some reactions may proceed at ambient temperatures at a rate sufficient to produce some heat and toxic gases, but not at a rate to present a hazard to human health or the environment.

3.2.1 Chemical Compatibility Evaluation

Based on the inventory evaluation table presented in Appendix B, the majority of chemicals are present in the waste in limited concentrations that are characterized as "trace" in the table. The chemicals that are identified as trace quantities in Appendix B are not evaluated further for compatibility as it is concluded there is not sufficient material present to lead to incompatible reactions. Chemicals likely to be present in the waste in minor or major quantities and concentrations based on the AK report also present no compatibility hazards, and are discussed below.

As noted above, Revision 2 of the AK summary report (CCP 2005) was the basis of the assessment in this EDF. To perform the evaluation, Table 4 in Revision 0 of this EDF was compared with the updated chemical inventory associated with Revision 2 of the AK summary report, and is reflected in Appendix B. The differences are limited and generally do not impact the conclusions of the original EDF. In summary, the following differences were noted:

- Asbestos, depleted uranium, dicalcium silicate, graphite, tetracalcium aluminoferrite, tricalcium aluminate, tricalcium silicate were added as new chemical constituents in minor quantities. Note that depleted uranium and graphite were assessed in Revision 0. The other minor constituents pose no compatibility hazard.
- The quantities of aluminum metal, hydrochloric acid, and hydrogen peroxide were increased from trace to minor. The changes in quantity were assessed and pose no compatibility hazard.
- The quantities of nitric acid and trichloroethylene were increased from minor to major. The evaluation and conclusions reached below remain valid, however.
- Shell Vitrea oil and Texaco Regal Oil were added as major constituents and pose no compatibility hazard.

Note that the ARP II area also contains Series 745 sludge waste that contains nitrate salts from evaporation ponds at the RFP. The chemical constituents associated with the Series 745 sludge were assessed in Revision 0 of this EDF. A detailed discussion of chemical compatibility considerations associated with the nitrate salt waste is included in Appendix A. The limiting of the compatibility evaluation to the chemicals discussed below is predicated on the assumed accuracy of Appendix B and the chemical inventory associated with the AK Summary report previously referenced. The actual presence of chemicals in concentrations greater than “trace” as reported in Appendix B could possibly result in adverse consequences due to unanticipated reactions.

Aluminum: See the discussion of compatibility considerations under “Metal turnings, shavings, powders” that is presented below.

Beryllium — Alcohols (Butyl and Methyl): Beryllium reacts with alcohols to form alkoxides, but the alcohols are not present in sufficient concentration within Pit 4 for a reaction to occur, and beryllium is present only in trace amounts.

Cadmium metal — Air: Finely divided metal is pyrophoric, but is unlikely to be present other than cemented in the waste.

Calcium chloride: No compatibility hazard.

Calcium fluoride: No compatibility hazard.

Calcium silicate: No compatibility hazard.

Carbon tetrachloride: Not reactive with other chemicals present; hence no compatibility hazard.

Sodium Cyanide — acids: May be present as discarded contaminated excess chemical, possibly in 25-lb quantities. Recommend separation if found packaged in waste; otherwise high water solubility (480 grams/liter at 10°C) will have resulted in dispersal throughout waste.

Ferric sulfate: No compatibility hazard.

Freon: No compatibility hazard.

Hydrochloric Acid: The compatibility considerations for hydrochloric acid are consistent with those discussed for nitric acid below.

Hydrogen Peroxide: May have been present in the original sludge formulation, but would have undergone decomposition considering the timeframe since disposal (i.e., approximately 40 years).

Lead metal: May be present, but relatively unreactive and presents no compatibility hazard.

Mercury metal: May be present as discarded contaminated excess chemical, but presents no compatibility hazard.

Metal turnings, shavings, powders — Air: While expected to be found cemented in the waste, and hence oxidized, any bags or other containers, if found, should be considered potentially pyrophoric and separated and handled accordingly.

Methanol: Only in trace to minor concentrations, presenting no compatibility hazards.

Nitric acid — Oils, cellulose (rags and paper), and other organics: Strong oxidizing agent, but should only be present in low concentrations due to high water solubility, and neutralization prior to and during cementation of waste. Not in high enough concentration for nitration of cellulose in rags or paper to nitrocellulose.

Plutonium and Plutonium Oxide — Air: Unoxidized plutonium metal could still exist in Area 1 of Pit 4.^b An oxide coating would be expected to be covering the plutonium metal; however, disruption of the coating could lead to a smoldering plutonium fire if a mixture of plutonium oxide and plutonium hydride were present on the surface and ignited. Plutonium forms sesquioxides (Pu_2O_3) as well as the most stable dioxide (PuO_2) (DOE-HDBK-1081-94). Therefore, depending on the conditions, even though all plutonium may have oxidized, a pyrophoric coating of oxides and hydrides could have formed in the presence of air and moisture. These could ignite on exposure to air.

Portland cement: No compatibility hazard.

Tetrachloroethylene (PCE): Not reactive with other chemicals present; hence, no compatibility hazard.

1,1,1-Trichloroethane (TCA): Not reactive with other chemicals present; hence, no compatibility hazard.

Trichloroethylene (TCE): Not reactive with other chemicals present; hence, no compatibility hazard.

Uranium and Uranium Oxide — Air: Unoxidized uranium could still exist in Area 1 of Pit 4 (see footnote a). An oxide coating would be expected to be covering the uranium metal; however, disruption of the coating could lead to a uranium fire if a mixture of uranium oxide and uranium hydride were present on the surface and ignited. Uranium forms sesquioxides (UO_2 and U_2O_5) as well as the more stable trioxide (UO_3). Therefore, depending on the conditions, even though all

b. John R. Dick Personal Conversation with James D. Navratil, July 1999, "Existence of Plutonium Metal in Pit 9," Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.

uranium may have oxidized, a pyrophoric coating of oxides and hydrides could have formed in the presence of air and moisture. These could ignite when exposed to air as could any unoxidized uranium metal. The roasting process was intended to convert all metal to U_3O_8 , but chunks of uranium metal have been found in drums of roaster oxide.

As documented in Revision 0, anecdotal and 1960s logbooks evidence strongly suggested^c the possibility of finding discarded radioactively contaminated excess chemicals in the waste. ARP I retrieval experience has verified the presence of such bottles. Any bottles found in the sludges should be treated with appropriate caution, as they may contain any chemicals used in the RFP production or laboratory areas during that time period. The possibility of peroxide-forming, or otherwise unstable, chemicals cannot be excluded. While dilute when used to stabilize 1,1,1-trichloroethane, 1,4-dioxane if present neat in bottles could form explosive peroxides. Other chemicals of concern that could contain peroxides if discarded in pure form in the waste include dibutyl carbitol, hexone, 2-butanone, and methylisobutyl ketone. Picric acid (2,4,6-trinitrophenol) was used in the RFP production facilities during the time in question. Hydroxylamine and hydroxylamine nitrate are also very energetic, and were also listed in the inventory. Any unidentifiable bottles found should be handled appropriately as potentially explosive.

Current ARP I and II safety analyses and operational procedures recognize and appropriately address the hazard posed by the bottles of chemicals. AK information demonstrates that the bottles are associated with ARP I and ARP II non-targeted waste streams. Consequently, the bottles will remain in or be returned to the Pit as non-targeted waste and will not be associated with repackaged targeted waste requiring storage and ultimate transfer to WIPP. Project training of operations personnel highlights the presence of bottles or other containers as a discriminating factor for identification of non-targeted sludge. That is, presence of bottles and other containers during visual examination discriminates the waste batch as non-targeted waste to be returned to the pit (Pit 4 Training Program, "Project Process Overview," 300RP017). For completeness, it is noted that the AK record does show one recorded instance of a chemical bottle contained within a Series 743 sludge drum from RFP operations many years after the Pit 4 and Pit 6 operational timeframe.^d Current operational plans do include steps to solidify contents of bottles that are found in 743 (i.e., targeted waste) sludge and including them in the waste to be sent to WIPP rather than returning them to the pit as described above for bottles in non-targeted waste. Given the undefined nature of such bottles associated with Series 743 sludge, and the lack of clear AK basis as to their actual presence in the sludge, chemical compatibility considerations for these bottles will not be assessed further in this report. Evaluation of the chemical compatibility considerations for these bottles will occur, as necessary, in a separate future evaluation or on a case-by-case basis in the event that the bottles are actually encountered in the Series 743 sludge.

Because of the unknown nature of the bottles and the diverse range of chemicals they may contain, mixing of the contents of the bottles may yield incompatible chemical reactions. Thus, intentional mixing of the chemical bottle contents should be avoided. Because the bottles will not be packaged out as part of the targeted waste streams (see visual examination discussion above), any potential chemical incompatibility issues associated with the chemical bottle contents do not pose a problem for management of targeted waste streams in storage or for transfer to WIPP. Operational and other steps will be implemented to minimize the potential for incompatible chemical reactions that could otherwise stem from inappropriate commingling of these chemical bottles in the context of returning them to or managing them in the pit.

c. Wastren Energy Services, 2004, Central Characterization Project Acceptable Knowledge Summary Report for a Described Area in Pit 4 at the Idaho National Engineering and Environmental Laboratory, CPP-AK-INEEL-001, Draft B of Rev 0.

d. Personal conversation between Brent N. Burton and Rod Kimmitt, June 7, 2006.

4. CONCLUSIONS

An examination of inventory records and AK documentation and consideration of possible binary combinations of wastes due to incidental mixing during retrieval operations reveals no incompatible combinations of waste, providing the repackaged waste is stored at ambient temperatures. Assessment of the modified chemical inventory documented through Revision 2 of the AK summary report identified only minor differences that do not introduce new incompatible combinations of waste.

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Appendix A
Potassium and Sodium Nitrate

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Appendix A

Potassium and Sodium Nitrate

A-1. POTASSIUM AND SODIUM NITRATE — METALS

Based on AK and inventory records, drums of Series 745 sludge containing sodium and potassium nitrate are not present in the ARP I retrieval area; however, an evaluation of the chemical compatibility considerations for Series 745 sludge is included in this section because there is known Series 745 sludge in the ARP II area.

The metals identified as presenting potential compatibility concerns with Series 745 sludge include beryllium, cadmium, chromium, lead, mercury, silver, and zirconium. In addition, plutonium, uranium, and calcium also are present. In the absence of heat, bulk metal will not react with sodium or potassium nitrate during packaging or storage. Powdered and finely divided metals are the basis of pyrotechnics and can react readily with potassium or sodium nitrate. Powdered or very finely divided cadmium, chromium, or zirconium should be mostly oxidized and no longer pyrophoric, but could be protected by a protective oxide coating which, if physically disrupted, might expose fresh metal surfaces. Calcium metal may be present but would not react with sodium or potassium nitrate because the latter alkali metals have a higher oxidation potential than calcium. Cadmium and chromium are known to react with fused ammonium nitrate below 200°C (392°F) (Bretherick 1991). While expected to be found cemented in the waste, and hence oxidized, any bags or other containers, if found, should be considered potentially pyrophoric and incompatible with Series 745 sludge and separated and handled accordingly.

The safety analysis for this project anticipates metal fires and that project operations are prepared to suppress them.

A-2. POTASSIUM AND SODIUM NITRATE — OILS

A series of tests was performed at the Energetic Materials Research and Testing Center at the New Mexico Institute of Mining and Technology (commonly known as New Mexico Tech) in Socorro, New Mexico, to determine the reactions of nitrate salts with potential fuels when heated (Dick 2001). The greatest concern was the possibility of an explosive reaction between the nitrate salts present in the SDA in the form of Series 745 sludge and the large amount of oils present as Series 743 sludge. These are mainly Texaco Regal R&O or Shell Vitrea machining oils, cut with chlorinated solvents such as carbon tetrachloride, tetrachloroethene, trichloroethene, and 1,1,1-trichloroethane. The oils were packaged with calcium silicate to form a solid sludge at the RFP, but after many years in the SDA they may have separated because of decomposition, displacement by water, sedimentation, evaporation, or condensation.

Oils becoming mobile when heated, running into ruptured nitrate drums, and exploding during in situ vitrification constituted one scenario of concern. Nitrates melting and flowing into oil drums, and again possibly exploding when heated, constituted another scenario. Furthermore, the carbon tetrachloride, postulated to reduce the reactivity of the oils, may well have evaporated from the oil and migrated, as evidenced by the large amounts of carbon tetrachloride removed from the SDA by organic contamination in the vadose zone extraction methodology, and consequently not be available as a fire suppressant.

The Independent Technical Review Panel (ITRP) performed preliminary tests to determine the explosive properties of nitrate salts when mixed with fuels (ITRP 1999). Mixtures of nitrates and 10% Regal Oil were tested for impact, static, and friction, without any initiations. A 1-gal mixture, when boosted with 150 g (5.3 oz) of Pentolite, did explode; however, the effects were estimated only by crater size. The Energetic Materials Research and Testing Center testers also were unable to cause explosions with mixtures of nitrates and oil.

Henkin and Koenen tests (Dick 2001) were conducted to determine critical explosion temperatures and violence of explosion under confinement. The Henkin and Koenen tests gave no explosions with the oil mixtures, even at the smallest orifice size in the Koenen test. The 5-gal container tests with oil, and with oil mixed with equal parts of carbon tetrachloride, only caught fire or smoked above 445°C (833°F). The drums were severely oxidized. The 55-gal drum test was heated for 1 week at 500°C (932°F) but did not explode. At 500°C (932°F) the oil distilled from the drum with decomposition. It may be possible to find a lower temperature at which the oil would not migrate but would eventually react fast enough with the decomposing nitrate salts to explode. The intimate interface of oil-soaked nitrate provides a possible reaction zone. The consequences of such an explosion could be severe because several hundred pounds could be involved with a nitrate drum into which oil has flowed. The mixture of oil and sodium or potassium nitrates is similar to ammonium nitrate fuel oil explosives; however, in the case of ammonium nitrate the compound can explode without any oil present. The diesel fuel sensitizes the ammonium nitrate and adds to the explosive energy, but is not necessary for an explosion. While not applicable to ambient temperature compatibility, attention is called to the potential hazard of any heat treatment of packaged drums.

In another test, the mixture of oil and nitrates did not ignite when the heaters arced and burned holes in the 5-gal drum. Burn rate tests were performed at the Energetic Materials Research and Testing Center to determine the flame propagation properties of nitrate salt mixtures. In the burn-rate tests, the nitrate and oil mixtures failed to ignite from a hot wire and propagate a flame front (Dick 2001).

During one blending of the oil with the nitrate test mixture in the drum tumbler, some of the mixture oozed from the mixing drum lid threads. The possibility of a chemical reaction was considered, but rejected because no heating or gas evolution was observed. The yellowing of the mixture was ascribed to traces of chromophores in the oil. After the mixtures were transported to the firing sites and poured into the 5- and 55-gal test containers, no heat or gas evolution was detected. During the heating at a rate of 100°C (212°F) increase per hour, evolution of CO, CO₂, NO, and NO₂ was observed, but no runaway reactions were experienced. No exothermicity was noted between 25 and 240°C (77 and 464°F), and mild exothermicity was noted in the radial thermocouple in the time versus temperature plots above 240°C (464°F).

At ambient temperatures, it is implausible that the nitrate salts if present will react with oils to produce either an explosion or a fire; therefore, they are not incompatible.

A-3. POTASSIUM AND SODIUM NITRATE — GRAPHITE

A nitrate mixture with 20-wt% graphite did not explode up to the maximum attainable temperature of 398°C (849°F) in the Henkin test. In the Koenen test, a 20-wt% graphite mixture resulted in a limiting diameter of 3 mm (0.1 in.), meaning the reaction fragmented the sample tubes. If the tests had been run for United Nations qualification of the material, the results would have been positive, meaning the material showed a violent effect on heating under confinement.

Graphite did not explode, but did burn on both the 5- and 55-gal scale when nitrate salts in an 80 to 20-wt% ratio were placed on top of the graphite and the drum was heated. The intense heat of the fires melted the drums. In Test 19, where the graphite and nitrate salts were mixed 100 turns, the reaction was energetic and rapid enough to disrupt the surface of the ground.

After mixing, the graphite and nitrate test mixtures were transported to the firing site and poured into the 5- and 55-gal test containers. No heat or gas evolution was noted and no attempt was made to monitor gas evolution during heating. The plots of time versus temperature for Test 19 shown in Appendix B (p. B-22) and Test 26 (p. B-33) of Dick (2001) clearly show no exothermicity from 25 to 500°C (77 to 932°F).

The Henkin and Koenen tests for critical explosion temperature and violence under confinement represent the worst-case scenarios because the drums actually present in the SDA contain mostly graphite pieces and are unlikely to contain all fines or scarfings. Nitrates in contact with graphite, as is the case with oil, provide opportunities for large explosive quantities in one drum. It must be noted that sodium nitrate is deliquescent; it will absorb moisture from its surroundings until it dissolves in the absorbed moisture. Further discussions of sodium nitrate deliquescence can be found in the *Yucca Mountain Science and Engineering Report Technical Information Supporting Site Recommendation Consideration* (DOE 2001). Tables of relative aqueous-vapor pressures of various mixtures of solids, and of solids with their saturated solutions, are available from the work of N. Schoorl (Schoorl 1930; Kolthoff and Sandell 1952). Based on information from a draft memo from Michael J. Rohe,^e relative humidity in the vadose zone is close to 100%. Like gunpowder, nitrate mixtures will not burn rapidly or explode if wet. The ITRP concluded that explosions are beyond extremely unlikely if the moisture content is greater than 5 wt%, based on the failure to obtain an explosive yield even with a Pentolite booster when the moisture content was 5 wt% in the mixture with oil (ITRP 1999).

At ambient temperatures, it is implausible that nitrate salts will react with graphite to produce either an explosion or a fire; therefore, the mixture is not incompatible. Nevertheless, the mixture could be ignited by an ignition source.

A-4. POTASSIUM AND SODIUM NITRATE — HALOGENATED ORGANICS (CARBON TETRACHLORIDE, CHLOROFORM, METHYLENE CHLORIDE, TETRACHLOROETHENE, TRICHLOROETHENE, 1,1,1-TRICHLOROETHANE, AND FREON 113)

Nitrates will not react with halocarbons at ambient temperatures. A carbon tetrachloride and oil mixture smoked but did not take fire when heated to 500°C (932°F) with a mixture of sodium and potassium nitrate (Dick 2001). After mixing, the oil, carbon tetrachloride, and nitrate, test mixtures were transported to the firing site and poured into the 5- and 55-gal test containers. No heat or gas evolution was noted. A yellowing of the mixture was noted and ascribed to traces of chromophores. During the heating at a rate of 100°C (212°F) increase per hour, evolution of CO, CO₂, NO, and NO₂ was observed, but no runaway reactions were experienced.

According to the ITRP report, “Organic chloride solvents are all fire suppressants; therefore, the pure oil and nitrate mixture is clearly a bounding scenario” (ITRP 1999, p. 13). Thus, any mixture with

e. Michael J. Rohe Personal Memorandum to George A. Beitel, “Relative Humidity in Vadose Zone Cavity (Draft),” January 18, 2002, Idaho National Engineering and Environmental laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

perchlorinated solvents should exhibit less reactivity than with the pure oil. Carbon tetrachloride has been employed as a fire extinguisher but has the disadvantage of forming phosgene at high temperatures. Nitrogen dioxide and dinitrogen tetroxide undergo explosive reactions with unsaturated chlorocarbons such as tetrachloroethene and trichloroethene, but heating to well above 200°C (392°F) would be necessary to decompose the nitrates to yield NO₂. Under ambient storage conditions, nitrate salts will not react with the halocarbons listed above and the mixtures are not incompatible.

The possibility of phosgene generation was considered. Carbon tetrachloride will react with oxygen at elevated temperatures (such as in a fire) to form phosgene (COCl₂). A similar reaction of carbon tetrachloride with nitrates was considered; the reaction does not proceed at ambient temperatures. Phosgene is a nonpersistent war gas and rapidly reacts with moisture to form carbon dioxide and hydrogen chloride, which renders it not useful for attacks in rain or fog. It would react rapidly with moisture in the interstitial dirt or with water in the deluge system in the event of a fire.

A-5. POTASSIUM AND SODIUM NITRATE — RAGS

Nitrate salts can react with cellulose materials. Bretherick reported jute bags of nitrates catching fire on board a ship in the tropics (Bretherick 1991) and flash paper is made by impregnating paper with nitrate solutions. During the explosives tests in New Mexico, nitrate salts placed on top of dry rags and Kimwipes and heated above 300°C (572°F) underwent a temperature excursion that caused the lids and bottoms to bulge but showed no evidence of an explosion (Dick 2001). Nitrate-soaked rags and Kimwipes exploded in these tests and at lower temperatures than the nitrates on top of pyrolyzed rags. The explosive effects were less because only 30 kg (66 lb) of soaked and dried rags could be forced into a 55-gal drum. A drum was ignited with a hot wire and exploded at a temperature of only 150°C (302°F). Again, this was a worst-case and highly implausible scenario. The 65-wt% nitrate ratio was chosen as the highest nitrate concentration that could be achieved by the ITRP in its tests (ITRP 1999). During testing, this concentration could be achieved only by soaking the rags in a saturated nitrate solution at 60°C (140°F). The stoichiometric ratio for burning-to-CO₂ would be closer to 73% nitrates. It should be noted, however, that the 52% nitrate-soaked rags in Test 12d burned 25% faster than the 63% nitrate-soaked rags in Test 12c. Cheetah computer code (LLNL 1998) calculations indicate a rather broad range over which the nitrate-soaked rags can burn or deflagrate. It is not difficult to construct a scenario in which nitrate salts are dissolved from drums in the SDA and transported in solution to rag-filled drums. However, it would be difficult for the wet rags to dry to such a concentration of nitrates underground. It is implausible that any rags in the SDA would be dry; nevertheless, it would be prudent to separate them. If the packaged waste were to undergo subsequent heat treatment, then dried nitrate-soaked rags would be a concern.

After drying, the nitrate-soaked rags were transported to the firing site and placed into the 5- and 55-gal test containers. No heat or gas evolution was noted. During the heating at a rate of 100°C (212°F) increase per hour, evolution of CO, CO₂, NO, and NO₂ was observed.

Nitrate salt mixtures with cellulose did not pass the test for exclusion from the U.S. Department of Transportation Class 5, Division 5.1 oxidizer status when the salts were diluted with 20% soil or 25% water. The addition of 30% water did result in a pass.^f

f. Peter G. Shaw E-mail to James J. Jessmore, May 6, 1999 (forwarded E-mail from Vince Mendoza, Stresau Labs, to Reva Hyde, Idaho National Engineering and Environmental Laboratory), "Preliminary Test Results, INEEL Soil Sample Oxidizer Tests," Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.

Nitrate salts combined with rags or tissues would not result in a chemical incompatibility at ambient temperatures. If the packaged waste were to undergo subsequent heat treatment, then dried nitrate-soaked rags would present a reactivity concern.

A-6. POTASSIUM AND SODIUM NITRATE — NITROBENZENE

Nitrates could react with nitrobenzene only in strong nitric acid with heating. The reaction to form meta-dinitrobenzene is endothermic and would not occur in the conditions currently existing in the SDA. Moreover, nitrobenzene is present, if at all, in trace quantities.

A-7. POTASSIUM AND SODIUM NITRATE — ORGANIC ACIDS, ALCOHOLS, ETHYLENEDIAMINETETRAACETIC ACID, ACETONE, AND XYLENE

In addressing the emplacement of Stage I probe holes, the ITRP concluded that reactions between nitrate salts and other organics is not a credible threat because they cannot come into contact in sufficient concentrations to produce an energetic event (ITRP 1999):

Second, for the concern that nitrates from 745-sludge may mix with organics in the 744-sludge, the alcohols, organic acids, and EDTA were mixed with Portland and magnesia cements, then covered with more Portland cement to form the 744-sludge (Ref. 14). In such a matrix, the organic acids would be tightly bound to the alkaline cement and the water-soluble alcohols would be solvated in the matrix like water. This would preclude their migration into nitrate sludge to form an explosive mixture. Third, although other organic compounds, such as butyl alcohol, xylenes, and acetone, are reported to be in Pit 9, the quantities are in parts per million and are of no concern because that level of concentration is insufficient to form a detonatable mixture with the nitrate sludge (Refs. 15 and 16).

No reactions have been hypothesized that could lead to explosion, rupture, or fumes even if the chemicals listed above were to become commingled; therefore, the mixtures are not incompatible.

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Appendix B

Chemicals Used by RFP and Non-RFP Generators

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Table B-1. Chemicals Used by RFP and Non-RFP Generators, from *Retrieval Area Chemical Evaluation and RCRA Hazards Analysis* (ID-C101, Rev. 1).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Acenaphthalene	NA	N/A	N/A	<i>This was found in sampling of the septic systems at ARA-II and ARA-III; there is no indication that this chemical was in any waste sent to the RWMC.</i>	ARA-P010
Acetaldehyde	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	Component of GE Antifoam 60 used in B771 in the Peroxide Precipitation process.	RF-P068
Acetamide (Ethanamide)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408
Acetic Acid	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B123, B444, P779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B123: used in the Laboratories. In B44: used for pickling depleted uranium and in Metallurgical Operations. In B771: used in Plutonium Metallurgical R&D. In B779: used in R&D operations. In B881 Enriched Uranium Recovery: used to pickle the U-235 button after the reduction step and in Metallurgical Operations. Component of Nitradd used in B881 in stainless steel work. Component of Kodak Industrex Fixer and Replenisher and Developer Replenisher used by NDT in B444 and B883.	RF-C216, RF-C224, RF-C227, RF-P084, RF-P181, RF-P260, RF-P408, RF-P422, RF-U151
Acetic acid, glacial	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P408, RF-P422
Acetic anhydride	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P408, RF-P422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Acetone (Dimethylketone; 2-Propanone)	RFO	trace	Present in the debris stream. B123, B441, B444, B559, B776/777, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B125 waste bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge. Still bottoms were sent to 903 Pad and were later processed into 74A/743 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B125, B441, B559, B771, and B881: used in Laboratories until 1968. In B444: used as a solvent for cleaning depleted uranium and beryllium parts and in the Metallurgical Laboratory. In B444: used to clean beryllium-copper alloy parts prior to electroplating. In B771, B776/777, and B779: used in plutonium parts cleaning. In B777: used in Assembly Operations. In B779: used in Nuclear Joining. In B881: used in Enriched Uranium parts cleaning and in the Analytical and Mass Spec. Laboratories. Component (50%) of Hollingshead Cocoon 333 used as a strippable paint and contamination covering on equipment in B559, B707, B771, B774, B776/777, and B779. Component of Glyptal 1511N Thinner and Glyptal Red Insulating Enamel used by NDT in B444, B776, and B881.	RF-C044, RF-C164, RF-C167, RF-C176, RF-C207, RF-C215, RF-C224, RF-C227, RF-C406, RF-P040, RF-P084, RF-P085, RF-P102, RF-P106, RF-P108, RF-P160, RF-P251, RF-P408, RF-U139, RF-U172, RF-U254
	ARA	trace	ARA - May be present in the debris stream.	ARA602, ARA606, ARA626 – Used as a solvent. ARA627 – Used in the Hot Cells and Laboratory as a solvent.	ARA-P009, ARA-P010, ARA-U001, ARA-U003, ID-P091, INTEC-P007
	CPP-601-5H: PER-601-1H: PER-ORM-1H: TAN	trace trace	CPP – May be present in the debris stream. PER, TAN – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent. PER, TAN – Source documents do not indicate usage for this chemical.	
	TRA	trace	TRA – May be present in the debris stream.	TRA – Used as a solvent. Used in the Hot Cells for degreasing.	
Acetonitrile (Methyl cyanide)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408, RF-U151
	CPP	trace	CPP – may be in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Acetophenone (Phenyl methyl ketone)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408
	CPP	trace	CPP – may be in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Acetylacetonate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D chemistry studies.	RF-P419
Acetylene tetrabromide (1,1,2,2-Tetrabromoethane; Tetrabromoethane)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent and as a float-sink separation process media in conjunction with beryllium work.	RF-P408, RF-U151, RF-U152, RF-U170
Acid Orange 7	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Acrylamide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Acrylamide sodium acrylate copolymer with trideceth-6	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408
Acrylic acid	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Acrylic enamel paint	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the Equipment and Repair building.	ARA-U003
Acrylic thinner	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the Equipment and Repair building.	ARA-U003
Acrylonitrile (Vinyl cyanide)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-U151, RF-P408
	CPP	trace	CPP – may be in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Activated carbon (Activated charcoal; Carbon; Norite A; porous carbon filters)	RFO	trace	Present in the debris stream. Present in the 741- and 742 sludges from B774 addition until at least 1964. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B774: used for adsorption in 1 st and 2 nd Stage Precipitation from 1954 to at least 1964 (Norite A). In B771 and B779: used in R&D operations. In B771: used in the Fluoride Volatility Plant and in filters for the fluorinator (National Carbon grade 60). In B779: included on an excess chemical list.	RF-C096, RF-P040, RF-P098, RF-P108, RF-P138, RF-P165, RF-P408, RF-P419, RF-U111, RF-U196, RF-U040, RF-U283
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Fume traps consisting of a bed of activated charcoal and AEC filters were used for the removal of iodine in the airstream for the fuel melt refining process.	ANL-W-P001
	ARA	trace	ARA - May be present in the debris stream.	ARA - At ML-1, used in carbon traps in the process gas loop.	ARA-P006

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Alcohol, not specific	RFO	trace	Present in the debris stream. Present in 744 sludge. B123, B444, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B559, B771, and B881: used in the Laboratories. In B444 and B771: used in the Metallurgical Laboratory in sample preparation.	RF-C226, RF-C227, RF-C408, RF-C411, RF-P408, RF-P068, RF-U201, RF-U233
Aliphatic amine	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure used in coating studies in TAN607.	TAN-P092
Aliphatic polyamine	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure used in coating studies in TAN607.	TAN-P092
Alkali phosphates	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used as a detergent to clean beryllium-copper alloy parts prior to electroplating.	RF-P160
Alkaline permanganate	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Decontamination solution used at the BORAX III, IV, and V reactors; consists of sodium hydroxide, potassium permanganate, water, and citric acid.	ARA-U003
Alkoxyated diamine	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743 sludge and/or burial in 742 sludge.	Component of Long Life 6100 used in B444 Metallurgical Operations.	RF-C227, RF-P408
Alkyl polyether alcohol	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Radiacwash used for decontamination in the TAN Hot Shop.	ARA-U003
Alkyd resin	RFO	trace	May be present in the debris stream. B991 liquid waste was bottled and sent to B774 for processing into 74A/743 sludge or 744 sludge, and/or burial in 742 sludge.	Component of Lubri Bond A used in B991 in Shipping and Receiving.	RF-P084
Alkyl aryl sulfonate	RFO	trace	May be present in the debris stream. B991 liquid wastes were bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	Component of Triple C Detergent used in B991 for cleaning drums in Shipping and Receiving. Component of Bon Ami used in B444 and B779 as a detergent to clean beryllium-copper alloy parts prior to electroplating.	RF-P040, RF-P084, RF-P160, RF-P408, RF-U242
Alkyl benzene (probably alkyl benzene)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743-, 744 sludge, and/or burial in 742 sludge.	Component of BP Dielectric 200 Fluid used in B444 in Electric Discharge Machining.	RF-P084

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Alkyl dimethylbenzyl ammonium chloride	RFO	trace	May be present in the debris stream. Present for a brief period of time in 741- and 742 sludge. B444 and B883 liquid wastes to B774, 742 sludge or to the solar evaporation ponds.	Component of HTH Algae Inhibitor used in B444, B559, and B883 in the process cooling water system and used briefly in B774 as a reagent in 741- and 742 sludge. Component of Mogul AG-471 used in Building 771.	RF-P084, RF-P091, RF-P094
Alkyl dimethyldichlorobenzyl ammonium chloride	RFO	trace	Present in the debris stream. B444 and B883 liquid wastes to B774, 742 sludge or to the solar evaporation ponds.	Component of HTH "Mustard" Algaecide used in B444, B559, and B883 in the process cooling water system.	RF-P084, RF-P094
Allyl alcohol	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Aluminosilicate fibers	RFO	trace	Present in the debris stream.	Component of Fiberfrax used in B776 as insulation in the molten salt extraction cells.	RF-P422
Aluminum-cadmium alloy	RFO	trace	May be present in the debris stream.	In B444, produced in the Foundry for an unknown purpose.	RF-U037
Aluminum chloride	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B559 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B559 and B771, used in the Laboratory. In B771 and B779, used in R&D operations.	RF-P202, RF-P349, RF-P408, RF-P424
Aluminum fines/powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779, used in the Coatings facility and in Thermogravimetric Analysis.	RF-P040, RF-P408
Aluminum hydroxide	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 used in coating studies in TAN607.	TAN-P092
Aluminum metal	RFO	minor	Present in the debris stream. Present in the CWS filter stream (the CWS/HEPA filter separators. Present in 74A/743 sludge from machining. B444, B447, B779, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge. Note that scrap aluminum chips from B444 were accumulated at a rate of 15 drums per week. Uncontaminated aluminum was recycled until cross-contamination of the lathes occurred in 1963; aluminum chips were then shipped as contaminated waste.	In B331: used in coating experiments with thorium. In B444: cast into ingots for processing into parts and in Tool and Gauge Machining. In B444 and B447: used in Physical Metallurgy and in the foundry; composited with depleted uranium; processed through electrochemical milling with stainless steel, brass, copper, tungsten, beryllium, and depleted uranium. In B771: used in the fabrication of Pu-242 and in the separators in CWS/HEPA incinerator plenum filters. In B779: used in the Coatings facility as a substrate and film, in Nuclear Joining used with beryllium, in the pyrochemical technology support laboratory, included on an excess chemical list, and used as a coating on boron nitride. In B881: used in the separators in CWS/HEPS incinerator plenum filters. In B883: used in Rolling and Forming.	RF-C123, RF-P021, RF-P040, RF-P047, RF-P063, RF-P075, RF-P084, RF-P085, RF-P105, RF-P184, RF-P216, RF-P240, RF-P348, RF-U033, RF-U037, RF-U040, RF-U235, ARA-U003

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
		trace	CFA – May be present in the debris stream.	CFA – Used in the clad of simulated fuel elements processed to recover the natural uranium and through the calciner in CFA-674.	ARA-U003
	CPP	trace	CPP – May be present in the debris stream.	CPP – Dissolution of aluminum-clad fuel was performed.	INTEC-P005, INTEC-P006, INTEC-U002
Aluminum nitrate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B771: used in combination with ferrous sulfamate or sulfuric acid in Anion Exchange to reduce plutonium in the solution to plutonium (III) and to complex any fluoride present from the dissolution process; used in Neptunium Anion Exchange for the same purpose; and used in R&D operations. In B779: used in R&D operations. In B881: used in Enriched Uranium Recovery operations.	RF-C211, RF-C224, RF-C227, RF-P026, RF-P084, RF-P091, RF-P104, RF-P108, RF-P224, RF-P260, RF-P333, RF-P349, RF-P408, RF-P423, RF-P424, RF-U141
	ARA	trace	ARA - May be present in the debris stream.	ARA – Used in the ML-1 reactor development.	ARA-P002, ARA-P002,
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the processing of simulated fuel in the calciner at CFA-674.	ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-U003, INTEC-P007, INTEC-P005, INTEC-U002
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories and in dissolution operations. Used by Chemical Engineering (CPP-620) in the High Bay Facility and in the Hazardous Chemical Waste Handling and Neutralization Facility (CPP-620 Annex). In CPP-640: used in stainless steel assembly dissolution.	
Aluminum nitride-silicon carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Aluminum oleate	RFO	trace	May be present in the debris stream. Present in the 74A/743 sludge.	Component of Anchorlube G-771 used as a cutting fluid in B881.	RF-C215, RF-C227, RF-P408
Aluminum oxide (Alumina)	RFO	trace	Present in the debris stream. Dissolved refractory material carried in waste liquids processed in B774. B771 liquid waste to B774, 741 sludge. B444, B447, B779, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771 and B881: used in incinerator firebrick. In B444 and B881: used in foundry firebrick. In B444, B447, B771, B779, B865, B881, B883: used in grit blasting. In B444, B447, B771, B777, B779, B865, B881: used in electropolishing. In B444: used in stopper rods in the Beryllium Foundry. In B771: used in the bed of the fluidized bed fluorinator. In B779: used in dissolution vessels in R&D for incinerator ash dissolution and included on an excess chemical list. In B881: used in the wash coating of beryllium billets prior to canning.	RF-C047, RF-C227, RF-P040, RF-P063, RF-P162, RF-P216, RF-P244, RF-P250, RF-P408, RF-P422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the calciner at CFA-674 during the recovery of uranium from simulated fuel elements.	ARA-P008, ARA-U003
	CPP	trace	CPP – May be present in the debris stream.	CPP – Source documents do not indicate usage.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used as cladding for some of the HTRE ceramic fuel inserts.	TAN-P080
Aluminum-silicon alloy	RFO	trace	Present in the debris stream.	In B444: used as a filler alloy in braze welding of beryllium.	RF-P081, RF-U231
Aluminum silicate	RFO	trace	Present in the debris stream.	In B771: crucibles used by the Manufacturing Technical group. Component of LECO crucibles. Component of the filter aid used in potassium hydroxide precipitation in americium recovery in B771.	RF-C047, RF-P333, RF-U139
Aluminum sulfate (Alum)	RFO	trace	May be present in the debris stream. B444 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and processed as 744 sludge and/or buried in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Fixer and Kodak Industrex Fixer and Replenisher used by NDT in B444 and B883.	RF-C216, RF-C224, RF-P084, RF-P408
American Industrial Oil No. 15 (643 oil [RFP nomenclature])	RFO	trace	Present in the debris stream. Present in 74A/743 sludge.	In B779, used in lathe coolant flammability studies (1970). Used as a light oil for hydraulic pump units on numerically controlled machine tools; used interchangeably with Texaco Regal A oil.	RF-C037, RF-P332
Americium, not specific	RFO	trace	Source document mentions that americium liquid may have been placed in wide-mouth jars covered with lead tape. May be present buried in 742 sludge. B771 liquid waste to B774, 741 sludge.	In B771: recovered from plutonium recovery wastes in the precipitation step; further processed for use in research.	RF-C045, RF-P058, RF-P106, RF-U141
Americium-241	RFO	trace	Present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B771: recovered from liquid plutonium waste (later molten salts).	RF-P058, RF-P178, RF-P181
Amine compound	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 669, used in coating studies in TAN607.	TAN-P092

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ammonia, anhydrous liquid	RFO	trace	Present in the debris stream. B123, B779, and B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123 and B881: used in the Laboratory. In B771 and B779: used in R&D operations. Component of Formula A Paint Remover and glass cleaners, used throughout RFP.	RF-C213, RF-C224, RF-P106, RF-P346, RF-P349, RF-P408, RF-P424
<i>Ammonia gas</i>	<i>RFO</i>	<i>NA</i>	<i>Uncontained gas.</i>	<i>In B881, used to precipitate enriched uranium from OY leach.</i>	<i>RF-P064</i>
Ammonium bicarbonate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4324 used in B779 in R&D studies.	RF-P422
Ammonium bifluoride (Ammonium hydrogen fluoride)	RFO	trace	Present in the debris stream. B444, B865, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in stripping titanium coatings (1987) and to remove beryllium oxide from metallographic samples. In B865: used in beryllium sheet etching R&D. Component of Turco Nitradd additive used in B881 stainless steel operations. In B881: used in Metallurgical Operations. Component of Enthone Activator used in B444 beryllium shape coating.	RF-C227, RF-C411, RF-P084, RF-P251, RF-P346, RF-P408, RF-U233
	ARA	trace	ARA - May be present in the debris stream.	ARA - Used in ML-1 reactor development.	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007
Ammonium carbonate	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in Depleted Uranium chip processing. In B881: used in Enriched Uranium Recovery involving incinerator ash dissolution.	RF-P191, RF-P408, RF-U113
Ammonium chloride	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B331: used as a flux in zinc baths used in experiments for coating thorium and used in the electroless plating of thorium. In B771: used in the Laboratory and in R&D operations. In B779: used in Electrocoating with uranium oxide and in R&D operations. In B881: used in the Laboratory. Component of Stay-Clean Soldering Flux used in B779 in R&D Operations.	RF-P075, RF-P084, RF-P346, RF-P347, RF-P348, RF-P408, RF-P421, RF-P424
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W - No use was identified in the source document.	ARA-P008

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ammonium chromate	RFO	trace	May be present in the debris stream. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. B771 liquid waste to B774, 741 sludge. B559 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B559, B771, and B881: used in the Laboratories in the analyses of calcium-lead alloy.	RF-P183, RF-P408
Ammonium fluoride	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Analytical Laboratory. Component of Derustit SS-3 used in B865 and B883 in developmental studies involving beryllium and depleted uranium.	RF-P073, RF-P333, RF-P408
Ammonium hydroxide (Aqueous Ammonia)	RFO	trace	Present in the debris stream. B123, B441, B444, B559, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories. In B444: used in plating operations and in Depleted Uranium chip processing. In B771: used in the purification of americium oxide, in U-233 Recovery Operations, and in R&D operations. In B779: used in Methods Development for recovering, separating, and purifying actinides from waste streams and residues; used in Chemistry Technology; and used in R&D operations. In B881: used in Metallurgical Operations and in Enriched Uranium Recovery involving incinerator ash dissolution. Component of Noxon metal polish used in B444 for cleaning beryllium. Component of Formula A Paint Remover used throughout RFP.	RF-C211, RF-C213, RF-C224, RF-C227, RF-P040, RF-P073, RF-P084, RF-P091, RF-P181, RF-P191, RF-P333, RF-P346, RF-P347, RF-P408, RF-P420, RF-P422, RF-P424, RF-U113
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003, INTEC-U002
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the processing of EBR-I Core II meltdown material.	
Ammonium nitrate	RFO	trace	Present in the debris stream (CWS/HEPA filters). B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B771: present on the surface of some CWS/HEPA filters. In B779: used in Chemistry Technology. In B881: salts present on the surface of CWS/HEPA filters.	RF-C089, RF-C224, RF-P021, RF-P026, RF-P137, RF-P224, RF-P408
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003
	TAN	trace	TAN – Possibly consumed in the experiment.	TAN – Component of dynamite used as a poison propellant in tests for the HTRE reactors (also tested at the BORAX I reactor).	TAN-P079

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ammonium oxalate (Diammonium salt monohydrate ethanedioic acid)	unknown	unk	Present in the debris stream.	Bottle of this chemical found in a debris drum during excavation. It is not known the site at which this material originated or the use the chemical was put to.	RF-C437, RF-P408
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in the decontamination solution (Turco 4521) used in the Hot Cell in TAN-607.	ARA-U003
Ammonium persulfate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444 and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory. In B771 and B779: used in R&D operations.	RF-C224, RF-U151, RF-P347, RF-P408, RF-P422, RF-P424
Ammonium purpurate acid (Murexide)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B444: used to determine the content of nickel in nickel plating baths.	RF-P251, RF-P408
Ammonium sulfate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in the Peroxide Precipitation process since 1953 as an alternate to sulfuric acid (for sulfate addition). In B779: used in Process Chemical Technology in Peroxide Precipitation.	RF-P040, RF-P091, RF-P262, RF-P408
Ammonium thiocyanate	RFO	trace	Present in the debris stream. B123 and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123 and B771: used in the Laboratories. In B771: used in the Americium Recovery process from 1959 to 1975. In B779: used in R&D operations.	RF-C205, RF-C211, RF-C224, RF-P058, RF-P068, RF-P071, RF-P073, RF-P181, RF-P260, RF-P262, RF-P332, RF-P346, RF-P408
Ammonium thiosulfate (Ammonium hyposulfate)	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Fixer and Kodak Industrex Fixer and Replenisher used by NDT in B444 and B883.	RF-C216, RF-P084, RF-P408
Ammonium vanadate	CPP	trace	CPP - May be present in the debris stream.	CPP - Used in the Laboratories.	INTEC-P007
Aniline	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408, RF-U151
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Anisole (Methoxybenzene)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Anthophyllite	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Antigorite	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Antimony	INL	trace	INL - May be present in the debris stream.	INL - Source documents do not indicate usage.	ARA-U003
Aqua Regia	TAN	trace	TAN - May be present in the debris stream.	TAN - Used in metallographic preparation at TAN.	ARA-P001
Aromatic petroleum solvent	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of Cee Bee solvent used in B771 for parts cleaning.	RF-P085
Arsenic metal	RFO	trace	May be present in the debris stream. B123 and B881 liquid waste to the solar evaporation ponds or treated in B774, 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B123: used in the Laboratory. Component of SEL-REX BDT 510 Make Up and SEL-REX BDT Brightener used in B881 Inertial Confinement Fusion. Component of some paints.	RF-P084, RF-P181, RF-P408
	ARA TAN	trace	ARA, TAN – May be present in the debris stream.	ARA, TAN – Source documents do not indicate usage.	ARA-P009, ARA-P010, ARA-U001
Arsenic trioxide (Arsenious acid)	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a standard.	INTEC-P007
Arsenious oxide	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559 and B771: used as a primary standard.	RF-P202

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Asbestos	RFO	minor	Present in the debris stream. Present in the CWS/HEPA filter stream. Present in 744 sludge.	In B123, B331, B334, B441, B444, B447, B559, B701, B705, B771, B774, B776/777, B779, B881, B883, B886, and B991 used in: CWS/HEPA filters, insulation, filler material, ceiling tiles, vinyl floor tile and mastic, drywall and joint compound, asphalt tile, roofing felt, black roofing tar, roofing silver paint, and Transite® wall board. In B883: used as part of a lubricant in beryllium drawing. Component of Magnesia cement used as an absorbent in B771, B774, B776, B777, and B779. In B774: used in 744 sludge with Portland cement.	RF-C415, RF-P021, RF-P022, RF-P026, RF-P028, RF-P040, RF-P041, RF-P057, RF-P058, RF-P059, RF-P060, RF-P063, RF-P064, RF-P065, RF-P092, RF-P093, RF-P094, RF-P095, RF-P181, RF-P244, RF-P408, RF-U067, RF-U152
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Asbestos used at the BORAX III, IV, and V reactors.	ARA-U003, INTEC-P005, PER-P006, PER-P008, PER-P012
	CPP	trace	CPP – May be present in the debris stream.	CPP – Some interior walls were made up of Transite®.	
	PER	trace	PER – May be present in the debris stream.	PER - Asbestos insulation used at SPERT III. Used in seal packing at SPERT II.	
Ascarite	RFO	trace	May be present in the debris stream.	Listed in an inventory from the Warehouse.	RF-C411
Ascorbic acid	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B559 and B779 liquid waste to B774, 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B771: used as a reducing agent in Neptunium recovery and in R&D operations. In B559 and B771: used in the Laboratory. In B779: used in R&D operations.	RF-C045, RF-C224, RF-P085, RF-P091, RF-P202, RF-P209, RF-P260, RF-P347, RF-P408, RF-P424
Atrazine 80%	RFO	none	Should not be present in any waste stream.	Used to control weeds.	RF-C242
Auramine	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Barium, not specific	RFO	trace	Present in the debris stream.	Present in leaded glass.	RF-P059
Barium-133	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Barium carbonate	RWMC	unk	unknown	Found in a list for the RWMC. Removed from final chemical table in the AK document after round table discussion with pertinent BBWI and North Wind personnel.	ID-U297
Barium chloride	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B441 and B881: used in the Laboratories.	RF-P072

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
<i>Barium fluoride</i>	<i>RWMC</i>	<i>unk</i>	<i>unknown</i>	<i>Found in a list for the RWMC. Removed from final chemical table in the AK document after round table discussion with pertinent BBWI and North Wind personnel.</i>	<i>ID-U297</i>
Barium powder	RFO	trace	May be present in the debris stream. B771 liquid waste to B771, 741 sludge. B123, B441, B444, B559, B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratory. In B444: used in the Metallurgical Laboratory.	RF-U151
	ANL-W ARA TAN	trace	ANL-W, ARA, TAN – May be present in the debris stream.	A fission product in the fuel elements in pin decanning and melt refining from EBR-II (ANL-W). Found during environmental and radionuclide sampling at ARA and TAN, not expected to be in the waste.	ARA-P009, ARA-P010, ARA-U001, ANL-W-P001
Barium sulfate	RFO	trace	May be present in the debris stream.	Component of Spot 'N Glaze Putty used in B881. Component of Fluorel® used in glovebox gaskets.	RF-C226, RF-P408, RF-P420
	TAN	trace	TAN - May be present in the debris stream.	TAN – Component of Amercoat 66 used in coating studies in TAN607.	TAN-P092
Batteries (lead-acid, nickel-cadmium, mercury, lithium)	RFO	trace	Present in the debris stream. Mercury and lithium batteries were buried in 742 sludge.	In B771: used in emergency lighting. Used throughout RFP in emergency lighting. In B774: mercury batteries were buried in the sludge (most likely 742 sludge). Mercury batteries had a problem with rupturing and exploding on the shelf while awaiting use. Lead-acid batteries were used in electric forklifts and in various building equipment.	RF-C099, RF-P040, RF-P084, RF-U034, RF-U035, RF-U040, RF-U121, ID-P200
	CFA	trace	CFA – May be present in the debris stream.	CFA – Batteries from equipment disposed from the Equipment and Repair Facility.	ARA-U003
Benzaldehyde	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation pond. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Benzene	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B777, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. In B771: used in R&D operations. In B777 (1966-1975): used in ultrasonic testing of weapons components. In B881: used as a Laboratory reagent. Component of paints and thinners throughout RFP.	RF-C164, RF-C406, RF-P085, RF-P408, RF-P421, RF-U182, ANL-W-P009
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007, TAN-P092
	TAN	trace	TAN - May be present in the debris stream.	TAN - component of Devran 232, Devran 232 Converter, and Devran 4170 Converter used in coating studies in TAN607.	
Benzenesulfonyl chloride	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Benzyl alcohol	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure used in coating studies in TAN607. Component of Devran 4170 Converter used in coating studies in TAN607.	TAN-P092
Benzylamine (Aminotoluene; Phenylmethanamine)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Benzyl chloride	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
o-Benzyl p-chlorophenol	RFO	trace	May be present in the debris stream. Present in 74A/743 sludge.	Component of Sani-Phene and Winterphene used in B881 to kill bacteria in machining coolant.	RF-C215, RF-P408
Benzyl triphenylphosphonium bisphenol AF salt	RFO	trace	Present in the debris stream.	Component of Fluorel® used as glovebox gaskets.	RF-P420
Beryllium-copper alloy	RFO	trace	Present in the debris stream. May be present in 74A/743 sludge from machining.	In B444: used in the production of WR parts.	RF-P160
Beryllium metal	RFO-DOW-20H	trace	Present in the debris stream, the graphite stream, and the CWS filter stream. Present in the 74A/743 sludge from machining. B331, B334, B441, B442, B444, B447, B707, B776/777, B865, B881, and B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B991 liquid waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 742- or 744 sludge and/or burial in 742 sludge. In B779, beryllium cutting fines were collected and stored in a drum, then	In B331: used in R&D processes. In B441: laboratory operations involving beryllium and small-scale machining (into the 1970s) were performed. In B442: the beryllium-contaminated clothing was laundered. In B444: used in casting, forging, heat treating, plating, briquetting, and processing. In B447: finished beryllium parts were examined in Material Analysis, processed through grit blasting and lapping (for special projects), and heat treatment was performed. In B448: beryllium storage. In B707 and B776/777: destructive testing was performed on beryllium parts.	RF-C227, RF-C445, RF-P040, RF-P057, RF-P063, RF-P064, RF-P065, RF-P084, RF-P085, RF-P086, RF-P102, RF-P105, RF-P167, RF-P181, RF-P184, RF-P216, RF-P240, RF-P244, RF-P408, RF-U037, RF-U038, RF-U115, RF-U124, RF-U150, RF-U151, RF-U152, RF-U153, RF-U235

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
			sent to B774 for disposal and beryllium fines from grinding were flushed down the process drain to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Solid turnings and fines from machining that were coated with oil were deposited in waste drums as noncombustible waste. Beryllium also may be included with disposed sources.	<p>In B771: processed in Part V leach; in mechanical testing; in metallography; and in Plutonium Recovery as a contaminant.</p> <p>In B777: used in machining, grit blasting, cleaning, brazing, and plating disassembly.</p> <p>In B779: used in machining, in Coatings as a substrate, and in tensile testing.</p> <p>In B865: casting, forging, rolling, forming, heat treating, plating, briquetting, and processing was performed on an R&D-scale.</p> <p>In B881: used in brazing operations, grit blasting, in R&D operations, and enclosed in stainless steel and sent to B883 for further processing.</p> <p>In B883: rolled, heat treated, and formed; stainless steel enclosing beryllium was removed and disposed here.</p> <p>In B991: handled during final assembly and in vapor deposition.</p>	
	ARA	trace	ARA – Present in the debris stream.	ARA – Used in ML-1 reactor development. Beryllium-contaminated liquid absorbed in vermiculite.	ARA-P002, ARA-P003, ARA-P004, ARA-P005, ARA-P006, ARA-P007, ARA-U003, ID-P091, INTEC-U002, TAN-P080
	CPP-601-4H:	trace	CPP – May be present in the debris stream.	CPP – Handled in CPP-601.	
	TAN-607-4H	trace	TAN – May be present in the debris stream.	TAN – HTRE 1 and 2 reactors, used in reflectors.	
	TRA-603-15H: TRA-670-1H: CFA-633-1H:	trace	TRA – May be present in the debris stream.	TRA - Beryllium reflectors from several reactors may be in the waste.	
	Rockwell Atomics International Division (ATI)	trace	ATI – Present in the debris stream.	ATI - Used in reactor development.	ID-P091, ID-U297, ID-U298
Beryllium oxide (Beryllia)	RFO	trace	Present in the debris stream. Present in the graphite stream. Present in the CWS/HEPA filter stream. B123, B331, B334, B441, B559, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	<p>In B123, B441, B559, B771, B881: used as standards in the Laboratories and contained in samples analyzed.</p> <p>In B331: used in R&D processes.</p> <p>In B334 and B705: used to make ceramics.</p> <p>In B881: special recovery project involving rejected beryllium-coated uranium fuel rods (several thousand).</p> <p>In B883: used as a mold wash for the graphite crucibles used in the beryllium foundry.</p> <p>Coors Porcelain produced fuel rods for the Tory II reactor. Waste containing beryllium oxide was trans-shipped to INL through RFP. Denver Research Institute trans-shipped waste containing beryllium oxide to INL through RFP.</p>	<p>RF-C227, RF-P065, RF-P084, RF-P085, RF-P086, RF-P093, RF-P095, RF-P181, RF-P244, RF-P408, RF-U038, RF-U115, RF-U124, RF-U150, RF-U151</p> <p>RF-C066, RF-C245</p>

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W - Melt refining ceramics from EBR-II.	ANL-W-P001, ARA-P006, ARA-P013, ID-P088, TAN-P080
	ARA	trace	ARA – May be present in the debris stream.	ARA – used in the fuel elements for ML-1.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Mixed with uranium oxide, used in most of the fuel elements for the ceramic fuel inserts for the HTRE reactors.	
Beryllium powder	RFO	trace	May be present in the debris stream. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge. B334 and B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B123, B441, B559, B771, B881: beryllium powder was used in standards in the Laboratory. In B334 and B705: used in ceramics manufacture. In B444: powdered beryllium was used in the sintering process during the 1950s and 1960s.	RF-C445, RF-P408, RF-U152
Beryllium sulfate	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used to coat graphite molds used in the beryllium foundry.	RF-P244, RF-P408
Bismuth powder	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used as a standard in the Laboratory. In B779: included on an excess chemical list.	RF-P040, RF-P071
Bismuth nitrate	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation pond. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084, RF-P408
Bismuth oxide	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used as a standard in the Laboratory.	RF-P071
Bisphenol AF	RFO	trace	May be present in the debris stream.	Component of Fluorel® used in glovebox gaskets.	RF-P420
Boric acid	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B444: used by the Technical Staff to electroplate thorium. In B881: used in Metallurgical Operations. Component of Kodak Fixer used by NDT in B444 and B883.	RF-C224, RF-C227, RF-P075, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	
	ARA	trace	ARA – May be present in the debris stream.	ARA – ML-1 reactor, used as a neutron poison to shut down the reactor in an emergency.	ARA-P006, ARA-P008, ARA-U003, INTEC-U002, PER-P006, PER-P011
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the calciner while processing simulated fuel elements in CFA-674.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Added to the feed for the Waste Calcining Facility.	
	PER	trace	PER – May be present in the debris stream.	PER - SPERT I and III used as a neutron poison to shut down the reactor in an emergency.	
Boron	ARA	trace	ARA – May be present in the debris stream.	ARA - Used in ML-1 reactor instrumentation.	ARA-P006, PER-P006, PER-P008, PER-P011, PER-P027, PER-P030
	PER	trace	PER – May be present in the debris stream.	PER - Impregnated in polyethylene strips used in reactor tests at SPERT IV (1% by wt.). Used as neutron poison in the SPERT I, III, and IV reactors, and in the BSR-II reactor.	
Boron-aluminum alloy (Binal)	PER	trace	PER - May be present in the debris stream.	PER - Used as a neutron poison in the SPERT I reactor and in the control blades in the SPERT IV reactor.	PER-P011, PER-P030
Boron carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173, RF-P408
	PER	trace	PER - May be present in the debris stream.	PER - Used in control blades in the SPERT-I reactor.	PER-P004, PER-P005
Boron nitride (Grade A; Grade HP)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B779, B865, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444, B771, B779, B865, and B881: used as a substrate (Grade HP) in Physical Metallurgy. Used as the sample holder in the crucible test apparatus.	RF-P173, RF-P184
Boron powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: included on an excess chemical list.	RF-P040, RF-P408
Boron trioxide	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P346

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Brass metal	RFO	trace	Present in the debris stream. May be present in 74A/743 sludge from machining.	In B444 and in B447: used in Physical Metallurgy and parts manufacturing. In B444: processed through electrochemical milling with stainless steel, tungsten, copper, aluminum, beryllium, and depleted uranium. In B771: used to tag conduit. Used throughout RFP in building plumbing, lighting, rivets, screws, springs, etc.	RF-P084, RF-P085, RF-U040
Bromine	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B559, B779, and B881 liquid waste to B774, 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations. In B444, B559, B771, and B881: used in beryllium laboratory analysis.	RF-P106, RF-P167, RF-P346, RF-P349, RF-P408
Bromobenzene (Phenyl bromide)	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B447, B776, B779, B881, and B883 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B991 liquid waste was containerized and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or buried in 742 sludge. May have been containerized for processing into 74A/743 sludge, 744 sludge, and/or burial in 742 sludge.	In 1966 and earlier, used by NDT in B441, B444, B447, B776, B779, B881, B883, and B981 for float-sink tests for plutonium and uranium.	RF-C037, RF-C224, RF-U153, RF-P407, RF-P408
Bromoform	ARA	unk	ARA – unknown	ARA – This information can from an environmental sampling effort at ARA. There is no indication that this was in the waste sent to the RWMC.	ARA-P010, INTEC-P007
	CPP	trace	CPP - May be present in the debris stream.	CPP - Used in the Laboratories.	
2-Bromo-2-nitro-1,3-propanediol	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B771: used in the Laboratory. Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P091, RF-P408
Bromophenol Blue	RFO	trace	Present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge, or the solar evaporation ponds.	Component of Oakite 12 used by NDT in B444, B447, and B991.	RF-P084, RF-P240

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Butanol (Butyl alcohol; sec-Butyl alcohol)	RFO-DOW-3H: Uncemented sludges RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B444, B559, B707, B776/777, B779, and B881 liquid waste to B774, 742 sludge, or the solar evaporation ponds. B771 liquid waste to B774, 742 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory. Used to react contaminated lithium chips through 1968. In B559, B705, B707, B771, B776/777, and B779: used to clean glovebox windows. Component of Dychem Steel Blue and Dychem dye penetrant, used in B444 for parts inspection. Component of Glyptal Clear Insulating Varnish and Glyptal Red Insulating Enamel used by NDT in B444, B776, and B881. Component of Triethane used in B771 in Product and Chemistry R&D.	RF-P084, RF-P086, RF-P100, RF-P106, RF-P114, RF-P408, RF-P419
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007, TAN-P092
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 669 used in coating studies in TAN607. Component of Plasite 7155 used in coating studies in TAN607. Component of Chemfast 547 used in coating studies in TAN607.	
Sec-butylbenzene	TRA	trace	TRA - May be present in the debris stream.	TRA - Component of Dowtherm J used as a heat transfer fluid.	ARA-P013, ID-P088
2-Butoxyethanol (Ethylene glycol monobutyl ether; butyl Cellosolve®)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B444, B776/777, and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B991 waste was bottled and sent to B774 for processing into 742-, 74A/743, or 744 sludge. Formula 409 and like cleaners were drummed and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. In B991: used in Physical Metallurgy as a solvent. Component of Freon TB-1 used in B771 in R&D and in B779 in Nuclear Joining, Plutonium Physical Metallurgy, and in Product Physical Chemistry. Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies for use in waste treatment operations and in plutonium decontamination studies. Component of Oakite 202 used in B444/447 to clean beryllium shapes. Component of Prime used in an R&D evaluation of commercial cleaning products. Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving and in B779 for an unknown purpose.	RF-C164, RF-C211, RF-C214, RF-C406, RF-C408, RF-C411, RF-P040, RF-P084, RF-P251, RF-P422, RF-P407, RF-P408, RF-U167

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Butyl acetate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or the solar evaporation ponds.	Component of Dychem Steel Blue dye penetrant and Dychem Remover and Thinner used by NDT in B444 for parts inspection. Component of Amercoat 450HS paint. Component of Spot 'N Glaze Putty used in B881.	RF-C224, RF-C226, RF-C411, RF-P084, RF-P106, RF-P408
Butylamine	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-U151
Butyl Carbitol® (Diethylene glycol monobutyl ether)	RFO	trace	Present in the debris stream. B444, B447, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Oakite Aluminum Cleaner NST and Oakite 202 used in B444/447 for ultrasonic cleaning of beryllium parts. Component of Oakite 204 used in R&D studies in B779.	RF-C164, RF-C227, RF-P084, RF-P251, RF-P422, RF-P408
Butyl lactate	RFO	trace	Present in the debris stream. B991 waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
1,2-Butylene oxide (1,2-Epoxybutane)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	Component of Alk-Tri used throughout RFP. Component of Chlorothene VG used in B771 in Product R&D and in Chemistry R&D. Component of Dowclene EC used in B771 in Product R&D. Component of Neu-Tri used in B771 to clean concrete, in plutonium Metallurgical R&D, in Product R&D, and in the Analytical and Mass Spec. Laboratories. Component of Tap Magic cutting fluid used in B444 Metallurgical operations.	RF-C227, RF-C410, RF-P102, RF-P187, RF-P408, RF-P420, RF-U026
Butyraldehyde	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-U151
C7-C10 saturated hydrocarbons	RFO	trace	Present in the debris stream in small amounts.	Component of Varsol 1®. Source documents do not specify building or indicate a use.	RF-P408, ID-U297
C. I. Solvent Red 64	RFO	trace	Present in the debris stream.	Component of DP-50 Dye Penetrant (Dubl-Chek) used in B444 in parts inspection.	RF-C215

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Cadmium cyanide	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been solidified using Portland cement and shipped to INL.	In B444: used in the Coating Laboratory.	RF-U422
Cadmium metal	RFO-DOW-3H:	minor	May be present in the debris stream. B123, B444, B559, B777, B779, B881, B883 liquid wastes to B774, 742 sludge, or to solar evaporation ponds. B991 liquid waste was bottled and sent to B774 for processing into 742-, 744-, and/or burial in 742 sludge. B771 liquid waste to B774, 741 sludge.	In B444: used in cyanide plating of thorium as a pre-coat prior to electroplating. In B444 and B991: used in plating; used in cyanide plating of thorium. In B444 and B883: rolled, shaped, machined, and alloyed. In B444: used in Special Order work and in R&D Operations. In B771: present as a result of impurities in feed and analytical solutions. In B777: used in baking. In B779: included on an excess chemical list. In B881: used in plating of uranium parts, used in casting, used in Special Order work, used in R&D Operations, and in flame spraying. In B991: used in plating and the inside of the final product shipping containers were covered with cadmium.	RF-C123, RF-C211, RF-C224, RF-C227, RF-C411, RF-P040, RF-P057, RF-P058, RF-P064, RF-P075, RF-P084, RF-P085, RF-P091, RF-P106, RF-P181, RF-P408, RF-U037, RF-U049, RF-U121, RF-U152
	ANL-W PER-601-1H:	trace	ANL-W, PER, TAN, TRA – May be present in the debris stream.	ANL-W, PER, TAN, TRA - Used as a neutron poison in reactors.	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-P009, ARA-U001, ARA-U003, ANL-W-P001, PER-P004, PER-P005, PER-P012, PER-P027, PER-P030, PER-P060, TAN-P077, TAN-P089
	TAN TRA-603-15H:			TAN – used to plate containers used to transport reactor and fuel components following destructive SNAP tests.	
Cadmium nitrate	RFO	trace	Present in the debris stream. B123, B444, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B705 and B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 742-, 744-, and/or burial in 742 sludge.	In B123, B559, B771, and B881: used in the Laboratories. In B444, B881, and B991: used in plating and coating. In B705: used in the Ceramics Laboratory.	RF-C224, RF-C411, RF-P085, RF-P181, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Cadmium oxide	RFO	trace	Present in the debris stream. B123, B444, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B705 and B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 742-, 744 sludge, and/or burial in 742 sludge.	In B123, B559, B771, and B881: used in Laboratory. In B444, B881, and B991: used in plating and coating. In B705: used in the Ceramics Laboratory.	RF-C227, RF-P085, RF-P106, RF-P181, RF-P408
Cadmium powder	RFO	trace	May be present in the debris stream. B123, B559, B777, B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B559, B771, B881: used in the Laboratories and in standards. In B705: used in the Ceramics Laboratory. In B777: used in baking.	RF-P058, RF-P095, RF-P181
Cadmium salts, not specific	RFO	trace	B771 cadmium salts consumed in the process, liquid waste to B774, 741 sludge. B881, B776, and B884 cadmium salts consumed in the process, liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771 and B881: cadmium salts were used as a neutron poison in dissolution. In B771, B776, B884: used as a neutron poison in bottles of aqueous waste in storage.	RF-C035, RF-C211, RF-P085, RF-P181
Calcium carbonate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B441, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B441, B559, B771, and B881: used in the Laboratories in the formulation of calcium master standards. Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P183, RF-P260, RF-P404, RF-P408, ID-P109
Calcium chloride	RFO	minor	Present in the debris stream. Present in 741- and 742 sludges as one of the B774 reagents in the precipitation process. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in R&D operations and in americium thermite reductions. In B774: used as a reagent in 1 st and 2 nd stage processing throughout. In B779: used in Direct Oxide Reduction, in Process Chemistry Technology, in R&D operations, and in the pyrochemical technology support laboratory.	RF-C224, RF-P040, RF-P047, RF-P108, RF-P260, RF-P262, RF-P137, RF-P333, RF-P346, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-U115, RF-U136, ID-P200
Calcium chromate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Calcium fluoride	RFO	trace	Trace amounts remaining on waste graphite and in SS&C. Graphite scarfings and SS&C were usually processed through dissolution in B771 to recover the plutonium. Minor amounts may be in SS&C and graphite not processed through recovery and in the debris stream. B444, B707, B776, B779, and B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B444: used to coat beryllium graphite molds. In B771: used in dissolution, and produced in all thermite reduction operations (Pu-239, Pu-242, EU, Np, U-233). In B707 and B776: used in mold coating. In B779: used in pyrochemical support for Direct Oxide Reduction and in R&D work for Plutonium Metal Reduction Technology. In B881: used by Instrumentation and Special Projects.	RF-P064, RF-P091, RF-P099, RF-P104, RF-P122, RF-P142, RF-P162, RF-P202, RF-P262, RF-P346, RF-P348, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U040, RF-U115, RF-U152
<i>Calcium-gallium alloy</i>	<i>RFO</i>	<i>NA</i>	<i>Should not be in any of the Pits.</i>	<i>In B776 and B779: used in Salt Scrub R&D and in the initial stages of production implementation in 1989.</i>	<i>RF-C420</i>
Calcium hydroxide (Caustic lime; Slaked lime)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Present in the 741-, 742-, and 744 sludges from B774 addition.	In B444: used to neutralize mop, sink, and miscellaneous water entering the sump pit. In B774: used to neutralize acids and acidic wastes with potassium hydroxide and sodium hydroxide.	RF-C224, RF-P108, RF-P408, RF-U113
Calcium hypochlorite	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory and in the process cooling water system.	RF-C224, RF-P084, RF-P408, RF-U151
Calcium-lead alloy	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge from machining operations.	In B444 or B881: alloy prepared for use in WR parts production.	RF-P183
Calcium-lithium alloy	RFO	trace	Residues were either processed through dissolution in B771 or were sent off-site for processing. B771 liquid waste to B774, 741 sludge.	In B779: calcium-lithium alloy was used in the Direct Oxide Reduction (DOR) as a reductant and used in studies for the recovery of plutonium and americium from molten salt residues.	RF-P420, RF-P421, RF-P424
Calcium metal	RFO	trace	Assumed to be consumed in the reaction. Some residual calcium metal may remain in the SS&C waste; usually processed through dissolution. The SS&C from plutonium operations that was not processed for recovery may be in the debris stream. B771 liquid waste to B774, 741 sludge. The SS&C from enriched uranium operations that was not processed for recovery may be in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in the Fluoride Volatility Process to convert plutonium tetrafluoride to plutonium metal; used in the Thermite Reduction of americium tetrafluoride to metal; used in the Thermite Reduction of neptunium tetrafluoride to metal; used in Thermite Reduction for: Pu-239, Pu-242, Cm-244, and U-233, U-235, U-236, and U-238. In B771: dissolution of salts from plutonium dioxide reduction work encountered free calcium metal. In B779: calcium metal used in Direct Oxide Reduction as a reductant, and in Plutonium Metal Reduction Technology to clean up MSE salts. In B881: used in Thermite Reduction of Enriched Uranium.	RF-C211, RF-P040, RF-P064, RF-P084, RF-P091, RF-P142, RF-P224, RF-P260, RF-P262, RF-P333, RF-P346, RF-P347, RF-P348, RF-P349, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U141

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Calcium nitrate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used as an etching solution. In B771: used in R&D operations.	RF-P084, RF-P091, RF-C224, RF-P408
Calcium oxide (Lime; Quicklime)	RFO	trace	Present in the debris stream. Present in the 744 sludge. Present in the 741- and 742 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B774: used for neutralization of acids prior to mixing into 744 sludge. May have been used to neutralize other acids. In B779: used in thermite reduction of plutonium dioxide (DOR); residues to B771 for recovery. In B881: used in beryllium billet wash prior to canning. Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-C224, RF-P047, RF-P244, RF-P260, RF-P262, RF-P404, RF-P408, RF-P422, RF-U115, RF-U136, ID-P109
Calcium silicate (Micro-Cel E)	RFO	major	Present in 74A/743 sludge. Also used as an absorbent in the empty drums left over after processing the waste oil/solvent mixture from 903 Pad. Present in the debris stream.	In B774: synthetic calcium silicate (Micro-Cel E) was used in the Organic Setups process (74A/743 sludge) and to absorb oil sludge left in the bottom of the 55-gallon drums from 903 Pad and plutonium production buildings.	RF-C404, RF-P047, RF-P097, RF-P108, RF-P260, RF-P408, RF-U067, RF-U100, ID-P109, ID-U297
Calcium sulfate	RFO	trace	Present in the debris stream. Present in 741-, 742-, and 744 sludges.	Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109
Calcium-zinc alloy	RFO	trace	Residues were processed through dissolution in B771 or were sent offsite for processing. B771 liquid waste to B774, 741 sludge.	In B779: calcium-zinc alloy was used in the Direct Oxide Reduction (DOR) as a reductant and used in studies for the recovery of plutonium and americium from molten salt residues (processed in B771).	RF-P420, RF-P421
Californium, not specific	RFO	trace	May be present in the debris stream.	In B444: used in sealed sources.	RF-P057
Californium-250	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Californium-252	RFO	trace	May be present in 742 sludge.	In B886: used in radiological check sources.	RF-P060
Carbon black	RFO	trace	Present in the debris stream.	Component of Bakelite used to mount metallographic samples in B444.	RF-P139, RF-U233

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference	
Carbon disulfide	RFO	trace	Present in the debris stream. B123, B559, B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B559, B771, B881: used in the Laboratory as a solvent. Detected in headspace gas sampling.	RF-C406, RF-P408	
	CPP	trace	CPP – may be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007	
Carbon dioxide	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Aero-Gel used in R&D studies in B779.	RF-P422	
Carbon tetrachloride (tetrachloromethane; perchloromethane)	RFO-DOW-12H: RFO-DOW-15H: RFO-DOW-3H: RFO-DOW-4H: RFO-DOW-6H: RFO-DOW-9H:	major	Present in the debris stream. Present in 74A/743 sludge. B707 and B776/777 machining oil/carbon tetrachloride waste was sent to B774 for processing into 74A/743 sludge after 1966. B123, B441, B559, B707, B776/777, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B771 R&D waste and some laboratory waste may have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	B123, B441, B559, B771, B881: used in laboratory operations. In B771: used as a lubricant in metallographic sample preparation, in neptunium metal degreasing, and in R&D operations. In B707 and B776/777: used in plutonium machining, plutonium fabrication, and in glovebox cleaning. In B779: used in Chemistry Technology and Plutonium Physical Metallurgy. Carbon Tetrachloride mixed with cutting and machining oils processed in B774 (Grease Plant). In B881: used in the Laboratory. In B991: used in Physical Metallurgy.	RF-C207, RF-C211, RF-C214, RF-C223, RF-C224, RF-C227, RF-C232, RF-C234, RF-P023, RF-P040, RF-P047, RF-P059, RF-P064, RF-P084, RF-P085, RF-P097, RF-P100, RF-P116, RF-P137, RF-P346, RF-P408, RF-P420, RF-P422, RF-P423, RF-U143, RF-U151, RF-U188, RF-U201, RF-U254, ANL-W-P009	
	ANL-752-1H:	trace	ANL-W – May be present in the debris stream.	ANL-W - Used as a solvent.		
	CPP-601-5H:	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories and as a solvent.		ARA-P009, ARA-U003, ID-P091, INTEC-P007
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used as a solvent. Used in the Chemical Laboratory in TAN-630. Used in the SPERT I reactor building (PER-605).		
Carburizing compound (contains cyanide)	RFO	trace	May be in the debris stream.	Inventory list in the Warehouse.	RF-C411	
Castor oil	RFO	trace	May be present in the debris stream.	Component of Celvacene grease, used in B444.	RF-P084	
CB+ aromatics	unk	trace	May be present in the debris stream.	Component of Varsol 1®. Source documents do not identify usage or building.	RF-P408, ID-U297	
Cellulose acetate butyrate	RFO	trace	May be present in the debris stream.	Component of Celvacene grease, used in B444.	RF-P084	
Ceramic, not specific	RFO	trace	Present in the debris stream.	In B776 and B779: used as the cups in the electrorefining process.	RF-P333, RF-P349	

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ceric sulfate	RFO	trace	Present in the debris stream. B123, B441, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559 and B771: used in the Laboratory for plutonium titration. In B123, B441, and B881: used in the Laboratories for uranium titration.	RF-C411, RF-P202, RF-P209, RF-U243, RF-P408
Cerium metal	RFO	trace	May be in the debris stream. B771 liquid waste to B774, 741 sludge. B776, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771, B776, and B881: used in Special Order work. In B779: used in the Coatings facility as a film.	RF-P064, RF-P084, RF-P184, RF-P264, RF-P408
Cerium monosulfide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Cerium powder	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173, RF-P408
Cesium, not specific	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: present in a mixture with mercury (1.66% cesium to 98.34% mercury) used for an unknown purpose.	RF-P040, RF-P408
Cesium-137	RFO	trace	Present in the debris stream. May be present in the 74A/743 sludge from machining. B123 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B123: used in sealed radiological check sources and sealed irradiator sources. Also used in radioactive spiked solutions used in the Laboratory. In B771: present in plutonium received from other Sites used in Special Projects. In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-P058, RF-P063, RF-P181, RF-P408
	ANL-W	unk	Unknown	ANL-W - Melt refining contaminant from EBR-II.	ANL-W-P001
Cesium chloride	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P347, RF-P349, RF-P424
Chlordane 46%	RFO	none	Should not be in any waste.	Used to control the population of black widows. Use was not allowed indoors.	RF-C242

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Chlorinated paraffin	RFO	trace	Present in the debris stream.	Component of Amercoat 33 paint used throughout RFP. Component of Vantrol used in Metallurgical Operations in B444.	RF-C227, RF-P106, RF-P408, RF-U040
	ARA	trace	ARA – May be present in the debris stream.	ARA – Used in ARA626 Hot Cell and Laboratory.	ARA-U003
Chlorinated paraffin oil	RFO	trace	Present in 74A/743 sludge. Present in the debris stream. B779 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Texaco Transultex 210 cutting and grinding oil used in B881. Component of Texaco Cold Forming Fluid used in R&D studies concerning the flammability of lathe coolant in B779.	RF-C215, RF-P332, RF-P408
Chlorine, anhydrous liquid	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	P184, RF-P408
Chlorine trifluoride	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P408, RF-U151
Chloroacetic acid (Chloroethanoic acid)	RFO	trace	Present in the debris stream. B123 and B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory. Component of Cee Bee solvent used in the production area of B444.	RF-P085, RF-P181, RF-P408
p-Chloroaniline	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Chlorobenzene	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory.	RF-P091, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Chlorodiphenyl	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	In B779: used in flammability studies.	RF-P332

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Chloroform (Trichloromethane)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B444, B559, B779, B881, and B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444 and B883: used in depleted uranium parts cleaning and inspection. In B559, B771, and B881: used in the Laboratories, replacing acetone ~1966. In B779: used in Chemistry Technology. Used by carpenters throughout RFP to join Plexiglas®. Degradation product of polyethylene.	RF-C214, RF-C224, RF-C406, RF-P040, RF-P084, RF-P085, RF-P086, RF-P106, RF-P209, RF-P408
	ANL-752-1H:	trace	ANL-W - May be present in the debris stream.	ANL-W – Source document did not specify use.	ARA-P010, INTEC-P007
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	
Chromate inhibitor	RFO	trace	May be present in the debris stream. B776/777 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B776/777: a component of Kathene used in the air drying system in the buildings.	RF-P085, RF-P408
Chromates, not specific	RFO	trace	Present in the debris stream. Present in Series 741, 742, 744 and 745 sludges.	Component of Portland cement used throughout RFP as an absorbent. Present in process cooling water throughout RFP.	RF-C415, RF-P058, RF-P260, RF-P404, RF-P408, ID-P109
Chromic Acid (chromic trioxide)	RFO	trace	Present in the debris stream. B444, B865, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in vibratory polishing for beryllium and by Metallurgical Operations in plating. In B771: used in Plutonium Metallurgical R&D. In B865: chromic trioxide used in stainless steel decontamination studies (beryllium and depleted uranium). In B883: used in beryllium etching.	RF-C044, RF-C224, RF-C227, RF-P057, RF-P084, RF-P108, RF-P135, RF-P244, RF-P333, RF-P408, RF-U172, RF-U422
	ARA	trace	ARA - May be present in the debris stream.	ARA – Used in polishing metallurgical samples.	ARA-P007, INTEC-U002
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in Neptunium Recovery operations performed in CPP-601. Used in cleanout of the dissolvers used in Neptunium Recovery operations.	
Chromium chloride	RFO	trace	May be present in the debris stream in small amounts. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in the Laboratory.	RF-P085, RF-P408
Chromium metal	RFO	trace	Present in the debris stream. B444, B559, B779, and B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in plating and in Non-Destructive Testing. In B771: present as a result of impurities in feed and analytical solutions; present in sand, slag, and crucible waste. In B779: used in Chemistry Technology, in Physical Metallurgy, and included on an excess chemical list. Component of some paints.	RF-C123, RF-P040, RF-P058, RF-P060, RF-P084, RF-P085, RF-P095, RF-P408, RF-U115

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used at the BORAX III, IV, and V reactors.	
	ARA CPP-601-4H:	trace	ARA, CPP - May be present in the debris stream.	ARA, CPP – Source documents did not specify usage.	ARA-P008, ARA-P009, ARA-P010, ARA-U001, ARA-U003
	TAN	trace	TAN – May be present in the debris stream.	TAN – Chromium alloy used in the L2C-1 insert cartridge tested in the late 1950s (IET). Chromium alloy used in fuel cladding material tested in the late 1950s. Chromium mixed with uranium oxide in some of the fuel elements for the HTRE reactors.	TAN-P078, TAN-P080, TAN-P081, TAN-P084
Chromium nitrate	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in the Laboratory.	RF-P085
Chromium oxide	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in the Laboratory.	RF-P085
Chromium potassium sulfate	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in the Laboratory.	RF-P085
Chromium powder	RFO	trace	May be present in the debris stream. B123, B559, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories. In B705: used in the Ceramics Laboratory. In B779: included on an excess chemical list.	RF-P040, RF-P058, RF-P095
Chromium sulfate	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in the Laboratory.	RF-P085, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Chromium trioxide, solid (chromic acid, solid)	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444 and B881: used in Metallurgical Operations.	RF-C227, RF-P408
Citric acid	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Enriched Uranium Recovery process.	RF-C224, RF-P084, RF-P260, RF-P408, RF-U099
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Radiacwash used for decontamination in the TAN Hot Shop.	
Coal dust	RFO	trace	Present in the debris stream.	Component of Bakelite used to mount metallographic samples in B444.	RF-P139, RF-U233
Coal Tar	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB used in coating studies in TAN607.	TAN-P092
Cobalt-60 (Co-60)	RFO	trace	Present in 742 sludge. Present in the debris stream. May be present in 74A/743 sludge from machining. B771 liquid waste to B774, 741 sludge. B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Used throughout RFP in sources. In B444: used in sealed sources. In B771: present in some plutonium used in Special Projects (from other Sites). In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building. In B886: used as a radiological check source.	RF-P057, RF-P058, RF-P060, RF-P063
Cobalt powder	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used as a standard in the Laboratory. In B705: mixed with tungsten and hot-pressed into containers/crucibles.	RF-P071, RF-P173, RF-P408
Cobalt metal	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: included on an excess chemical list.	RF-P040
	PER	trace	PER – May be present in the debris stream.	PER – cobalt wires used during reactor tests at SPERT IV.	PER-P030

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Cobalt nitrate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory as a standard.	RF-P071, RF-P408
Color pigment	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Phenoline 302 Part A used in coating studies in TAN607.	TAN-P092
Concrete	RFO	trace	Present in the debris stream.	In B771: used as shielding. Rubble from structural renovation and maintenance throughout RFP. In B991: some waste was concreted in drums.	RF-P047, RF-U040, RF-U067, RF-U100
	INL	trace	INL – In the debris stream.	Some waste items were cemented in shipping containers.	ID-U297
	Rockwell ATI	trace	ATI – In the debris stream.	Some items from ATI were cemented in place in the drum prior to shipment. Other items were shipped in concrete “conduits” or culverts.	
	Trans-shipped	trace	Trans-shipped waste – in the debris stream.	Some other off-Site non-RFP wastes were loaded into concrete boxes with concrete lids.	
Copper cyanide	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in the copper strike when electroplating beryllium-copper alloy parts.	RF-P160, RF-P408
Copper metal	RFO	trace	Present in the debris stream (copper turnings and casting skull). Present in 74A/743 sludge from machining. B444, B447, B777, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge.	In B331: used in coating experiments with thorium and in cyanide plating of thorium. In B444: used in cyanide plating of thorium as a pre-coat prior to electroplating. In B444 and B447: cast into ingots, used as molds in the vacuum arc melt furnaces, used in Physical Metallurgy, used in plating, used in Tool and Gauge Machining, used in Special Order work, used in R&D Operations, and processed through electrochemical milling with stainless steel, brass, tungsten, aluminum, beryllium, and depleted uranium. In B771: copper wiring present in capital equipment and other items wasted after the 1957 fire. In B771 and B881: used in gaskets on the reduction furnaces. In B777: used in pit components in Assembly Operations. In B779: used in Physical Metallurgy, in R&D operations, in the Coating facility as a film, for electroplating worn utility and process equipment, and included on an excess chemical list. Used as a coating on boron nitride. In B881: used in brazing operations, in Special Order work, and in R&D Operations. Used for piping for water and lathe glovebox drain piping throughout RFP.	RF-C123, RF-P040, RF-P047, RF-P064, RF-P075, RF-P084, RF-P085, RF-P105, RF-P171, RF-P184, RF-P240, RF-P260, RF-P332, RF-P348, RF-P404, RF-P408, RF-U038, RF-U057, RF-U067, RF-U124

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Copper sulfate (Cupric sulfate)	RFO	trace	May be in the debris stream. B779, B865, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Nuclear Joining and in the Coating Facility. In B865: used in beryllium etching R&D. In B881: used in Metallurgical Operations and in the Laboratory.	RF-C227, RF-P040, RF-P084, RF-P346, RF-P408
	TAN	trace	TAN – May be present in the debris stream.	TAN – a component of Marbles, used in metallographic preparation.	
	PER	trace	PER – May be present in the debris stream.	PER - used in reactor vessel cleaning.	ARA-P004, PER-P006
Copper triethanolamine complex	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of HTH “Mustard” Algaecide, used in B559.	RF-P094
<i>Cresol (-p, -o, -m)</i>	ARA TAN	N/A	N/A	<i>This was found during environmental sampling at ARA and TAN. There is no indication that there is any in Pit 4.</i>	ARA-P009, ARA-P010
Crystalline silica	RFO	trace	Present in the debris stream. Present in 741-, 742-, and 744 sludges.	Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109
Cumene hydroperoxide	RFO	trace	May be present in the debris streams.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Curium dioxide	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Received at RFP in 1966 for conversion to curium-244 metal in B771 where it was mixed with plutonium and processed in Special Order work.	RF-U119
Curium-244 metal	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B123, B776, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B771: laboratory-scale preliminary recovery processes were performed to recover the curium beginning in September 1966 and continuing until October 1967. Laboratory-scale process development work in B771 progressed from 1971 to 1972. Production-scale recovery from the residues was not completed until the 1976. Remaining residues were shipped to Savannah River. In B771, B776, B881: used in Special Order work from 1966 to 1967. In B881: 3 grams of this material was converted from metal to oxide in the mid-1960s (1966-1967).	RF-P064, RF-P084, RF-P181, RF-P260, RF-P264, RF-P408, RF-U119
Curium, not specific	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory.	RF-P181

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Cyanide compounds, not specific	RFO	trace	Present in the waste stream.	Large amounts of these salts were set up with cement and shipped out as contaminated waste.	RF-U416
Cyanide plating solution, not specific	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been containerized and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. May have been solidified with cement and shipped to INL.	On a Warehouse inventory. In B444: used in plating and coating activities, including cadmium plating of thorium, and in the Metallurgical Laboratory. In B881: copper and chromium plating using cyanide was performed.	RF-C224, RF-P064, RF-P075, RF-P084, RF-P106, RF-P420, RF-U294, RF-U422
Cyanide salts, not specific	RFO	trace	Some cyanide salts were cemented and buried at RFP, some were shipped to INL. Waste from the Precision Shop was not contaminated. Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Small amounts (non-contaminated) were reacted with hypochlorite or caustic and sulfur compounds and dumped in the sanitary sewer.	In B444: used in heat treating baths in the Precision Shop (until at least 1974).	RF-C045, RF-C110, RF-C156, RF-C414, RF-C415, RF-P404, RF-U100, RF-U101, RF-P404, RF-P405, RF-U416
Cyanide standards	RFO	trace	May be in the debris stream. B881 liquid waste to B774, 742 sludge or to solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: cyanide standards were used in the Laboratory.	RF-P084
Cyanide solutions	RFO	trace	B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B444, early (1954) cemented cyanides were buried in a trench at RFP. May be present in the debris stream.	In B881: source document mentions the cyanide solutions in conjunction with an unnamed process and includes a reference to a similar process in B444. In B444: some cyanide waste was treated using a caustic chlorination process and cemented. Later (1963), these wastes were sent to B881 for destruction, but presence of fluoride and depleted uranium caused problems in B881.	RF-C110, RF-C156, RF-C414, RF-C415, RF-P051, RF-U100, RF-U101
Cycloaliphatic polyamine	TAN	trace	May be present in the debris stream.	Component of Amercoat 78HB Cure used in coating studies in TAN607.	TAN-P092
Cyclohexane	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123 and B771: used in the Laboratories. In B771: used in R&D operations.	RF-C044, RF-C224, RF-P091, RF-P106, RF-P108, RF-P181, RF-P408, RF-U172
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	INTEC-P007
Cyclohexanone	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Cyclohexylamine	RFO	trace	May be present in the debris stream. B776 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies for use in waste treatment operations and in plutonium decontamination studies.	RF-P408, RF-P421, RF-P422, RF-U167
(1,2-Cyclohexylene dinitrilo)tetra-acetic acid (CDTA)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory. Component of TISAB used in the Laboratory in B771.	RF-P091, RF-P408
1,3,5,7-Cyclooctatetraene (COT)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B779, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D chemistry studies.	RF-P419
Cyclotrimethylene trinitramine (Cyclonite; RDX)	TAN	trace	TAN – Assumed to be consumed in the experiments.	TAN – Component of C-3 explosive used as a poison propellant in tests for the HTRE reactors.	TAN-P079
9D-178 amine	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for burial in 742 sludge.	In B881: used in enriched uranium R&D operations.	RF-P191
Depleted uranium alloy, not specific	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining. Present in Roaster Oxide.	In B444: used in weapons production.	RF-P063, RF-P117

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Depleted uranium metal (Tuballoy; Uranium-238; U-238) 	RFO	trace	Present in the debris stream; possibly as slabs or chunks. Present in Roaster Oxide. Present in the graphite. Present in the CWS filters. Present in the 74A/743 sludge from machining. In B444, from the mid-1950s to the 1970s, condensate containing depleted uranium from a waste oil evaporator was sent to B774 for treatment. B123, B441, B444, B447, B779, B881, B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B334 and B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or disposal in the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, and B881: present in the Laboratories. In B334: specialty machining conducted and old machining equipment from B444 and B881 were installed here. In B444: used in briquetting, casting, forging, and machining. In B447: parts manufacturing and processing. In B705: used in Special Projects. In B779: used as a substrate in the Coatings facility. In B883: depleted uranium rolling and turning. There is a possibility that unoxidized uranium may be present in the CWS/HEPA filters and graphite from B444, B447, and B883.	RF-C021, RF-C045, RF-C108, RF-C123, RF-C129, RF-C403, RF-P040, RF-P047, RF-P051, RF-P057, RF-P063, RF-P084, RF-P085, RF-P086, RF-P092, RF-P095, RF-P105, RF-P117, RF-P134, RF-P181, RF-P402, RF-P403, RF-P408, RF-U115, RF-U400
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Trans-shipped waste from EBR-I that may contain depleted uranium blanket material.	ANL-W-P003
	CPP	trace	CPP – May be present in the debris stream.	CPP – Leached from Vycor glass scrap received from ANL-W.	INTEC-U002
Depleted uranium metal, highly enriched (99.999% U-238)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B881: used to fabricate standard disks for the LMFBR diagnostic program.	RF-P333
Depleted uranium oxide; includes oxides of depleted uranium alloys (Roaster oxide; RO)	RFO	minor	Present in the debris stream. Present in the Roaster Oxide stream. Present in the CWS filter stream. There may be unoxidized uranium remaining in the roaster oxide. Sludge containing depleted uranium was collected, air dried, and packaged as RO. At times, the sludge was introduced to the chip roaster. If the sludge burned, it was labeled RO; if it did not burn, it was labeled sludge. Source document indicates that the RO was packaged in 30-gallon drums overpacked into 55-gallon drums.	In B447: beginning in 1956 the chip roaster was used to oxidize depleted uranium and depleted uranium alloys and composites (except stainless steel) turnings and chips for off-site shipment. Between 1958 and 1962 the chip roaster was not operational due to re-siting and ventilation fixes. Source document indicates that there was no sorting of depleted uranium metal and depleted uranium alloys going to the chip roaster.	RF-C045, RF-P047, RF-P057, RF-P066, RF-P084, RF-P085, RF-P117, RF-P562, RF-U053, RF-U054, RF-U115, RF-U400
Depleted uranium-molybdenum alloy	RFO	trace	Present in the debris stream. Present in the 74A/743 sludge from machining operations. B444, B776, and B777 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Residues from the ZPPR project were not recovered at RFP. They were sent to Hanford for recovery.	In B444, B771, B776/777: (from 1966 to 1969) used in production for the ZPPR project. Uranium-molybdenum alloy was produced in B444 and sent to B771 where plutonium was added. The Pu-Mo-U alloy was then sent to B776/777 where the stainless steel envelope was installed.	RF-C045, RF-C113, RF-C219, RF-C220, RF-C222, RF-P061, RF-P117, RF-P240, RF-P420, RF-P422, RF-P423, RF-U407

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Depleted uranium-molybdenum-titanium alloy	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Present in the 74A/743 sludge from machining operations.	In B444: prepared in Metallurgical R&D.	RF-C113
Depleted uranium-molybdenum-zirconium alloy	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge from machining.	In B444: used in Special Projects for LRL.	RF-C045
Depleted uranium-neptunium alloy	RFO	trace	May be present in the debris stream. Present in 74A/743 sludge from machining. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: prepared in the Metallurgical R&D.	RF-U243
Depleted uranium-niobium alloy (Binary alloy)	RFO	trace	May be present in the debris stream. Present in the 74A/743 sludge from machining operations. B444, B447, B777, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444, B447, B777, B865, B881, and B883: used in weapons production (from 1967 to 1989). In B447: uranium-niobium processed through the vacuum arc melt furnace.	RF-C010, RF-C035, RF-C045, RF-C113, RF-P084, RF-P117, RF-P248, RF-P408, RF-U128, RF-U230, RF-U242, RF-U244, RF-U245, RF-U407
Depleted uranium-niobium-molybdenum alloy	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: prepared in Metallurgical R&D.	RF-U245
Depleted uranium-niobium-titanium	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Present in 74A/743 sludge from machining operations.	In B444: prepared in Metallurgical R&D.	RF-C113
Depleted uranium-niobium-zirconium alloy (Mulberry alloy; Ternary alloy)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining operations. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: produced in Metallurgical R&D from at least 1964.	RF-C045, RF-C113, RF-P166, RF-P408, RF-U245
Depleted uranium-titanium alloy	RFO	trace	Present in the debris stream. Present in the 74A/743 sludge from machining operations.	In B444, B447, B881, and B883: used in weapons production. Recovery was not performed until mid-1980s.	RF-C045, RF-C113, RF-P003, RF-P117
Diacetone alcohol	RFO	trace	May be present in the debris stream. B991 waste was bottled or drummed and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
Diallyl phthalate	RFO	trace	Present in the debris stream.	In B444: used to mount samples for metallographic analysis.	RF-U233
Diazodinitrophenol (DDNP)	PER	trace	PER – Possibly consumed in the experiments.	PER – Used as an internal fuse tested in the HTRE reactors in the ANP program (tests performed at SPERT I).	TAN-P079

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Dibutyl Carbitol® (diethylene glycol dibutyl ether)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Raffinate from this system was processed into 74R sludge and was sent to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B771: used in Special Recovery's Enriched Uranium Recovery process. In B881: used in Enriched Uranium Solvent Extraction.	RF-P084, RF-P191, RF-P260, RF-P408
Dibutyl-N, diethylcarbomoyl phosphonate-N (DDCP)	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory to detect plutonium and americium in blood and urine by titration.	RF-P181
Dibutyl phthalate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Dicalcium silicate	RFO INL	minor	Present in 741-, 742-, and 744 sludge. Present in the debris stream.	Component of Portland cement, used as an absorbent throughout RFO.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109
Dicalite®; Hi-Flo®; Solka-Floc® (an organic filter aid) (Diatomaceous earth; filter aid; Diatomite) Diatomaceous earth and sand	RFO INTEC	trace	Present in the debris stream. Present in the 741- and 742 sludge. May be present in 74A/743 sludge.	In B774: used to coat the vacuum drum filters for 741- and 742 sludge. In B771 and B779: used to coat the drum filters in the Dissolution and Precipitation processes and for the off-gas scrubber. In B779 and B771: Solka-Floc® used in americium recovery process. In B881: Hi-Flo® used to coat the filters in Enriched Uranium Recovery. Diatomaceous earth is a component of Oil-Dri used to absorb liquids.	RF-P040, RF-P047, RF-P260, RF-P263, RF-P332, RF-P333, RF-P408
	NRF	trace	NRF - Used in the ECF and at S1W: absorbed radioactive spills or solidified small volumes of radioactive organic liquids generated at ECF and in S1W.	NRF – Used in the ECF and at S1W: absorbed radioactive spills or solidified small volumes of radioactive organic liquids generated at ECF and in S1W. Also used in the ECF as a filter media in the ECF water pit clarity systems.	INTEC-C001, INTEC-P001, NRF-C031
Dicesium hexachloroplutonate (DCHP)	RFO	trace	May be present in the debris stream in small amounts. B776 and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B776: used in Molten Salt Extraction (1989). In B779: used in R&D operations and in the pyrochemical technology support laboratory.	RF-P040, RF-P084

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Dicesium plutonium hexachloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B776 and B779 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. Some wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D chemistry studies. In B776 and B779: used in early plutonium Electrorefining.	RF-P121, RF-P346, RF-P348, RF-P419, RF-P420, RF-P423, RF-P424
1,2-Dichlorobenzene (o-dichlorobenzene)	RFO	trace	May be present in debris stream. B559 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B559 and B881: used in the Laboratories.	RF-C214, RF-P408
1,2-Dichloroethane (Ethylene dichloride; Dichloroethylene)	RFO	trace	May be present in the debris stream. B559 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and processed in B774, into 74A/743 or 744 sludge and/or burial in 742 sludge.	In B559, B771, and B881: used in the Laboratories as a solvent.	RF-C214, RF-P408
1,1-Dichloroethylene	RFO	trace	May be present in the debris stream. Radiolysis product of 1,1,1-trichloroethane, found in headspace gas sampling.	For RFP wastes, noted as a possible radiolysis product of 1,1,1-trichloroethane.	RF-C406, RF-P408, ARA-P009, ID-P091
1,2-Dichloroethylene	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Dichlorodifluoromethane (Freon 12)	RFO	trace	May be present in the debris stream. Present in 74A/743 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B881: used in the production of parts for Inertial Fusion. Component of Molykote 557 Lubricant (aerosol can), used in assembly testing in B444. Component of Magnaglo and Dubl-Chek.	RF-C408, RF-P064, RF-P084, RF-P408
1,2-Dichloropropane	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
1,2-Dichloropropylene	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Diesel fuel	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Release 1 VOC spilled in the SDA and cleaned up during excavation.	ID-C202
Diethanolamine	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of Long Life 6100 used in B444 Metallurgical operations. Component of Johnson's TL-131 used in B444 Metallurgical operations. Component of Vantrol used in B444 Metallurgical operations.	RF-C227, RF-P408
Diethylbenzene	TRA	trace	TRA - May be present in the debris stream.	TRA - Component of Dowtherm J used as a heat transfer fluid.	ARA-P013, ID-P088

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Diethylene ether (1,4-dioxane; p-dioxane; diethylene dioxide)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Chlorothene VG and Dowclene EC used in B771 in Product R&D. Component of Zyglo ZC-7 used in B444 NDT. Component of Triethane used in B771 Product R&D and in Chemistry R&D. Used as an inhibitor (2.5% [w/w]) in 1,1,1-trichloroethane.	RF-C164, RF-C404, RF-P100, RF-P102, RF-P106, RF-P187, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Diethylene glycol	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of Kodak Developer used by NDT n B444. Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies for use in waste treatment operations and in plutonium decontamination studies.	RF-C408, RF-U167
	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Cat® ELC (Extended Life Coolant) Premix 50/50 and Cat® ELC (Extended Life Coolant) Premix 60/40 spilled in the SDA and cleaned up during excavation.	ID-C202
Diethylenetriamine (DETA)	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Phenoline 302 Part B used in coating studies in TAN607.	TAN-P092
Diethylenetriamine-pentaacetate (DTPA)	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Dog parts and feces were buried in 742 sludge or in 744 sludge.	In B122: given to workers exposed to the following: high-fired plutonium oxide during a fire in B776/777 in 1965; to an explosion in B776 in 1964; to individual exposed to plutonium contamination several times over employment. Blood, urine, and fecal samples were analyzed in B123. Given to rats that were part of the DMSO study undertaken by CSU and RFP beginning 2/1969 (plutonium dog study began in 4/1968). Analysis of fecal material and body parts was performed in B123.	RF-P177, RF-P178, RF-P199, RF-U026, RF-U128
Diethyl ether	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Chlorothene VG used in B771 Product R&D and in Chemistry R&D.	RF-C164, RF-C411, RF-P102, RF-P187

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Diethyl formamide	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Di-2-ethylhexylphosphoric acid	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for burial in 742 sludge.	In B881: used in enriched uranium R&D operations.	RF-P191, RF-P192, RF-P408
<i>Diethyl phthalate</i>	<i>ARA</i>	<i>N/A</i>	<i>N/A</i>	<i>This was found in environmental sampling at ARA; there is no indication that it was in the waste sent to the RWMC.</i>	<i>ARA-P010</i>
1,1-Difluoroethene	RFO	trace	Present in the debris stream.	Component of Viton® used in glovebox gaskets.	RF-P420
Diglyme bis(2-methoxyethyl) ether	RFO	trace	May be present in the debris stream. B991 waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy and in solvent replacement testing.	RF-P084
Dihexylhexylphosphine oxide	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for burial in 742 sludge.	In B881: used in enriched uranium R&D operations.	RF-P191
Dihydrogen phosphate	RFO	trace	May be present in the debris stream. B776/777 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	Component of Nickel Tungsten Plating Solution used for plating in B771, B776/777, and B779.	RF-P348, RF-P408
4-([2,4-Dihydroxy phenyl]azo) benzenesulfonic acid (Tropaeolin Yellow; Tropaeolin O; Acid Orange 6)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory.	RF-C410, RF-P084, RF-P408
Dimethoxymethane	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	Component of Tap Magic cutting fluid used in B444 Metallurgical operations.	RF-C227

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Dimethylamine	RFO	trace	May be present in debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Chemistry Technology.	RF-P040, RF-P408
Dimethyl dichlorosilane (Dichlorodimethylsilane)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation pond. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used as a Laboratory reagent.	RF-P084
Dimethyl formamide	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been containerized and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in plating baths and in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408, RF-U153
Dimethylglyoxime	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B123: used to remove excess nickel in the Ni-DTPA complex when analyzing the rate of excretion of DTPA.	RF-P178, RF-P408
Dimethyl, methylhydrogen siloxane	RFO	trace	May be present in the debris stream.	Component of Silastic E-RTV Rubber Curing Agent, used by NDT in B881.	RF-C212, RF-C226, RF-P408
Dimethyl, phenylmethylsiloxane, trimethyl-terminated (silicone oil)	RFO	trace	Present in 74A/743 sludge. Present in the debris stream. B776, B779, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Dow Corning 550 used in baths to cool uranium parts in B883 and used in plutonium rolling mills in B776. Used in R&D studies concerning the flammability of lathe coolants in B779.	RF-C035, RF-P084, RF-P128, RF-P332, RF-P408, RF-P562, RF-U115
Dimethyl phthalate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Dimethyl polysiloxane	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	Component of GE Antifoam 60 used in B771 in Peroxide Precipitation.	RF-P068
Dimethyl silicone fluid	RFO	trace	May be present in the debris stream	Component of Molykote 557 Lubricant (aerosol can) used in assembly testing in B444.	RF-P084, RF-P408
Dimethyl sulfate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Dimethyl sulfoxide (DMSO)	RFO	trace	Present in the debris stream. B123, B444, and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Dog parts and feces were buried in 742 sludge or 744 sludge drums.	In B123: processed excrement and dog bodies in support of the DMSO study performed jointly with CSU. In B444: used in the Metallurgical Laboratory as a solvent and in plating baths. In B771 and B779: used in R&D chemistry studies.	RF-C164, RF-P408, RF-P419, RF-U026, RF-U128, RF-U151, RF-U153

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
<i>Di-n-butyl phthalate</i>	TAN	N/A	N/A	<i>This was found in environmental sampling at TAN; there is no indication that it was in the waste sent to the RWMC.</i>	ARA-P009
Dipentene	RFO	trace	Present in the debris stream. B444, B447, and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of Oakite Penetrant used by NDT in B444 and B447. Component of Kerful used in R&D studies in B779.	RF-C224, RF-P408, RF-P422
Diphenyl (biphenyl)	TRA	trace	TRA - May be present in the debris stream.	TRA - Component of Dowtherm A used as a heat transfer fluid.	ARA-P013, ID-P088
Diphenyl oxide (phenyl ether)	TRA	trace	TRA - May be present in the debris stream.	TRA - Component of Dowtherm A used as a heat transfer fluid.	ARA-P013, ID-P088
Dipropyl ether	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
α - α' Dipyridyl	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559 and B771: used in Laboratory operations.	RF-P202
Disodium aspartate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in voltammetric studies of Neptunium.	RF-P420
Disodium hydrogen phosphate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4324 used in B779 in R&D studies.	RF-P408, RF-P422
Distilled tall oil fatty acids	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Release 1 VOC spilled in the SDA and cleaned up during excavation.	ID-C202
2,6-Diterbutyl-p-cresol	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	Component of BP Dielectric 200 Fluid used in B444 in Electric Discharge Machining.	RF-P084
2,6-Diterbutyl-4-methylphenol	RFO	trace	Present in the 74A/743 sludge. May be present in the debris stream.	Component of Texaco Regal A Oil used throughout RFP; a rust and oxidation inhibitor.	RF-P084, RF-P408, RF-P332, ANL-W-P009
Dithioloalac acid	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B123: used to destroy the Ni-DTPA complex when analyzing the rate of excretion of DTPA.	RF-P178

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Dodecane	RFO	trace	May be in the debris stream. B771 liquid waste to B774, 742 sludge. B991 liquid waste was bottled and sent to B774 for processing into 742 sludge, 744 sludge and/or burial in 742 sludge.	In B771: used in Special Recovery to recover uranium in a solvent extraction process. In B991: used in Physical Metallurgy.	RF-P084, RF-P091, RF-P408
Durchlor 51, Durchlor D (silicon-iron alloys)	RFO	trace	May be present in the debris stream.	In B881: used in corrosion studies.	RF-C035
Dynamite	RFO	NA	Should not be in the waste stream.	In B993: used to bond depleted uranium with stainless steel.	RF-P041
EDTA (Versene®; ethylenediamine tetra-acetic acid; EDTA-Na ₂ ; ethylenediamine tetra-acetic acid disodium salt; EDTA Ferric sodium salt)	RFO	trace	Present in debris stream. Present in 744 sludge. May be present in 742 sludge mixed and in buried containers. B123, B441, B444, B559, B779, and B881 liquid waste to B774, 742 sludge or the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in a solution to determine the nickel concentration in beryllium nickel plating baths. In B123, B441, B559, B771, and B881: used in the Laboratories. Component of Johnson's TL-131 used in B444 Metallurgical operations. Component of Varsol® solvent used in B444 Metallurgical operations, and in B779 for sample preparation for x-ray analysis, tensile testing, and plutonium metallurgy. Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies for use in waste treatment operations and in plutonium decontamination studies. Component of the cleaning agent "KW" (a mixture of Versene®, Igepal, citric acid, and water) used throughout RFP in the 1950's and 1960's for decontamination purposes. Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving and in B779 for an unknown purpose.	RF-C045, RF-C110, RF-C227, RF-P026, RF-P040, RF-P047, RF-P084, RF-P251, RF-P408, RF-U028, RF-U040, RF-U099, RF-U167, ID-U297
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Radiacwash used for decontamination in the TAN Hot Shop.	ARA-U003
Enriched uranium metal (Uranium-235; U-235; Orallo; EU)	RFO	trace	Present in the debris stream. Present in the 74A/743 sludge from machining. B444, B779, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B334: machining equipment from B881 installed here. In B444: may have been cast and machined in small quantities. In B779: used in Production Physical Chemistry. In B881: enriched uranium fabrication operations, machining operations, recovery operations, R&D operations, and Laboratory operations.	RF-C089, RF-P040, RF-P057, RF-P063, RF-P084, RF-P085, RF-P092, RF-P181, RF-P224, RF-P408, RF-U247

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B883: enriched uranium rolling and forming and R&D operations; house vacuum system accumulated chips and fines for recovery in B881; annually, fines accumulated in bottom of salt baths were collected and returned to B881 for recovery. B881 and B883 enriched uranium operations, except R&D, Oralloy leaching, and Laboratory operations, ceased approximately 1965. Oralloy leaching (OY Leach) moved to B771 in 1973.	
Enriched uranium metal, highly (99.91%-U-235)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B881: used to fabricate diagnostic standard disks for the LMFBR diagnostic program.	RF-P333
Epoxy glues and adhesives	RFO	trace	Present in the debris stream.	In B447: used for tabbing beryllium parts. In B881: used in Special Projects. In B771: used in metallurgical operations. In B881: used in the Inertial Fusion project and in the Special Weapons Project (Model Shop). Epoxy glues used throughout the plantsite.	RF-P064, RF-P084, RF-P408, RF-U217
Epoxy resin	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB and Amercoat 66 used in coating studies in TAN607. Component of Devran 232, Devran 669 Converter, and Devran 4170 used in coating studies in TAN607.	TAN-P092
Erbium nitrate	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used to coat non-nuclear parts.	RF-P084
Erbium oxide	RFO	trace	May be present in the debris stream.	In B707 and B776/777: used to coat stainless steel molds used to form plutonium ingots.	RF-P084
Essential oils	RFO	trace	Present in the debris stream.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Ethanol (Ethyl alcohol; Denatured alcohol)	RFO	trace	May be in debris stream. B122 liquid waste to the solar evaporation ponds. B444, B707, B776/777, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B122: used for personnel decontamination. In B444, B776/777, B779, and B881: used to clean beryllium parts. In B444: used in final polishing, in etching, and in the Metallurgical Laboratory. In B705: used in ball milling of refractory material to form powders. In B707: used by the Calibration Laboratory to clean precision gauges prior to measurements. In B771: used in 1954 to wash the precipitate cake formed in Peroxide Precipitation.	RF-C045, RF-C164, RF-C215, RF-C224, RF-P040, RF-P059, RF-P064, RF-P084, RF-P085, RF-P135, RF-P173, RF-P222, RF-P240, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B777: used in Assembly operations and in the Metallographic Laboratory. In B779: used in Nuclear Joining and in Product Physical Chemistry. In B881: used in Special Projects and in the Laboratory. Component of Noxon metal polish used in B444 for beryllium cleaning. Component of Dychem Penetrant, Dychem Steel Blue Penetrant, and Dychem Remover used in B444 in parts inspection. CPP – Source documents did not specify a use.	
	CPP-601-5H: Organic solvents	trace	CPP – May be present in the debris stream.		
	PER	trace	PER – May be present in the debris stream.	PER – Used in the SPERT I reactor building (PER-605).	ARA-U003, ID-P091, TAN-P092
	TAN	trace	TAN - May be present in the debris stream.	TAN - Used as a degreaser. Component of Plasite 7155 used in coating studies in TAN607.	
	TRA-632	trace	TRA – May be present in the debris stream.	TRA – Used at TRA-632 for degreasing.	
Ethanolamine	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May be present in the 74A/743 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Cimcool used in B444 as a coolant for D-38 machining.	RF-C164, RF-P084, RF-P408, RF-U254
Ether, not specific	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123 and B771: used in the Laboratories.	RF-P106, RF-P181, RF-P346, RF-P408
2-Ethoxyethanol (ethylene glycol monoethyl ether; Cellosolve®)	RFO	trace	May be present in debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in Plutonium Metallurgical R&D.	RF-C044, RF-P108, RF-P218, RF-P408, RF-U172, RF-U201, RF-U217
Ethoxylated nonylphene	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Zygl Developer ZP-9 used in B444.	RF-C215, RF-P408
Ethoxylated tallow amine	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ethyl acetamide	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
n-Ethyl acetate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and processed into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations. In B991: used in Physical Metallurgy. Component of Spot 'N Glaze Putty used in B881.	RF-C226, RF-P084, RF-P346, RF-P349, RF-P408, RF-P423
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	INTEC-P007
Ethyl acrylate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Ethyl benzene	RFO	trace	Present in the debris stream. May be present in 742 sludge. May have been bottled and processed in B774, 744 sludge and/or burial in 742 sludge.	Component of various paints, thinners, and strippers. Component of Spot 'N Glaze Putty used in B881.	RF-C226, RF-P408, ARA-P009, ID-U297
	TAN	trace	TAN - May be present in the debris stream.	TAN – Component of Amercoat 66 used in coating studies in TAN607. Component of Devran 232 and Devran Converter used in coating studies in TAN607. Component of Phenoline 302 Part A and Part B used in coating studies in TAN607.	TAN-P092
Ethylene dibromide (1,2-dibromoethane)	RFO	trace	May be present in the debris stream. B559 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559, B771, and B881: used as a solvent in the Laboratories	RF-C214
Ethylene glycol (ethylene alcohol)	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B123, B444, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and processed in B774, into 74A/743 or 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory. In B444: used in beryllium nickel plating, in electropolishing, and in the Metallurgical Laboratory as a solvent. In B771 and B881: used in metallographic sample preparation. Used by maintenance throughout RFP. Used in electropolishing throughout RFP. Component of Texaco Soluble D metal working oil used in B881. Component of Aero-Gel used in R&D studies in B779. Component of Stay-Clean Soldering Flux used in B779 R&D Operations.	RF-C164, RF-C215, RF-C227, RF-P084, RF-P181, RF-P218, RF-P250, RF-P251, RF-P348, RF-P408, RF-P422, RF-U201, RF-U217, RF-U233, ANL-W-P009

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	SDA	trace	SDA - Present in the debris stream.	SDA – Component of Cat® ELC (Extended Life Coolant) Premix 50/50 and Cat® ELC (Extended Life Coolant) Premix 60/40 spilled in the SDA and cleaned up during excavation activities.	ID-C202
Ethylene glycol butyl ether (Ethylene glycol monobutyl ether; Butyl Cellosolve®)	RFO	trace	May be present in the debris stream. Present in 74A/743 sludge.	Component of hydraulic fluids used throughout RFP and INL.	ARA-U003, PER-P012
	PER	trace	PER - May be present in the debris stream. Present in 74A/743 sludge.	PER - Component of Altrex detergent used in reactor cleaning at SPERT II. Used in vinyl and acrylic paints and varnishes, enamel and spray lacquers.	
Ethylene glycol dinitrate	TAN	trace	TAN – May have been consumed in the experiment.	TAN – Component of dynamite used as a poison propellant in tests for the HTRE reactors (also tested at the BORAX I reactor).	TAN-P079
Ethylene glycol monomethyl ether (2-Methoxyethanol; methyl Cellosolve®)	RFO	trace	May be present in the debris stream. B123, B441, B559, B777 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories replacing acetone in 1968. In B771 and B777: used in R&D operations.	RF-C044, RF-C224, RF-U172, RF-P106, RF-P108, RF-P408
Ethylene oxide (1,2-Epoxyethane)	RFO	trace	May be present in the debris stream. Present in 744 sludge. Present in 742 sludge in buried containers.	In B778: with Freon as a carrier, used to disinfect respirators. Component of Igepal CO 430 and Igepal CO 530 (<0.0002%) used in “KW” detergent. Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies for use in waste treatment operations and in plutonium decontamination studies.	RF-P026, RF-P408, RF-U028, RF-U152, RF-U167, ID-U297
2-Ethyl hexanoic acid diester with tetraethylene glycol	RFO	trace	Present in the debris stream.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
2-Ethylhexanol	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for burial in 742 sludge.	In B881: used in Enriched Uranium Recovery operations involving incinerator ash dissolution.	RF-P191

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
bis(2-ethylhexyl)phthalate (di-octyl phthalate; DOP)	RFO	trace	Present in the debris stream and CWS filter streams. Any liquid may have been treated in B774, 741-, 742-, or 744 sludge.	Used for testing CWS/HEPA filters.	RF-U152, RF-P026, RF-P138, RF-P408
	ARA TAN	unk	unknown	Found during environmental sampling of the underground tanks at TAN and at ARA.	ARA-P009, ARA-P010, PER-C001
Ethyl methacrylate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Eutectic salt baths, not specific	RFO	trace	Present in the debris stream.	In B883: used to heat-treat (heating, anneal, etc.) depleted uranium and alloys, enriched uranium, and beryllium prior to rolling and forming. Sludge comprised of spent salt and uranium oxide was drummed and shipped to INL.	RF-P063, RF-P084, RF-U115
Explosive plasticizer	TAN	trace	TAN - Possibly consumed in the experiments.	TAN – Component of C-3 explosives used as a poison propellant in tests for the HTRE reactors.	TAN-P079
Fatty soap	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B991 liquid waste was containerized and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving and in B779 for an unknown purpose. Component of Fiske Fibercool used in B444 for an unknown purpose. Component of Texaco Soluble Oil CX metal working oil used in B444 for machining depleted uranium.	RF-C035, RF-C227, RF-P040, RF-P084, RF-P408
Ferric chloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. Present in 741- and 742 sludge from B774 testing.	In B771 and B779: used in R&D operations. In B774: used in tests to determine an improved method of liquid waste treatment.	RF-P408, RF-P420, RF-U048
Ferric nitrate	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B881: used to precipitate enriched uranium from Incinerator scrubber water. Sludge was processed to recover the enriched uranium. Water was sent to B774 for processing.	RF-P260, RF-P408
Ferric sulfate	RFO	minor	May be present in the debris stream. Present in 741- and 742 sludges. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Large quantities of this chemical were used in 1 st and 2 nd Stage precipitation in B774. In B771 and B779: used in aqueous waste decontamination studies. In B771: used in preparation of Neptunium oxide.	RF-C096, RF-C224, RF-P098, RF-P108, RF-P165, RF-P260, RF-P408, RF-P419, RF-P421, ID-P200
Ferrite powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge, or sent to the solar evaporation ponds.	In B779: used in Waste Treatment R&D.	RF-P040

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Ferrouin solution (ortho-phenanthroline-ferrous complex)	RFO	trace	May be present in the debris stream. Some laboratory waste was bottled and sent to B774 for processing to 744 sludge and/or buried in 742 sludge. B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B559 and B771: used in the Laboratories in plutonium titration.	RF-P209, RF-P408
Ferrous sulfamate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771: used in anion exchange to reduce plutonium in the solution to plutonium (III) and to complex any fluoride present from the dissolution process and in Neptunium anion exchange for the same purpose.	RF-C224, RF-P026, RF-P084, RF-P091, RF-P260, RF-P333, RF-P408, RF-P423
Ferrous sulfate	RFO	trace	May be present in the debris stream. Present in 741- and 742 sludge until 1959 from B774 addition. B771 liquid waste to B774, 741- sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in Neptunium recovery and in R&D radiolysis studies. In B774: used until 1959 in the 1 st and 2 nd Stage Precipitation. In B779: used in R&D radiolysis studies.	RF-C211, RF-P260, RF-P408, RF-P419, RF-U048, RF-U111, RF-U283
Finely-divided depleted uranium and uranium powder	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: several fires involving finely divided uranium powder in ducting in 1970. Some placed into cans and disposed in drums. In B771 and B779: uranium powder used in R&D operations.	RF-C045, RF-P003, RF-P240, RF-P246
Flocculating agents (Purifloc® 501; Purifloc® 601; Separan® 2610; Separan® NP-10)	RFO	trace	May be present in the debris stream. Will be present in 741- and 742 sludge.	In B774: Separan® used in 1 st and 2 nd Stage precipitation, in addition to other reagents, to enlarge the size of particles in the waste to allow settling. In B774: Purifloc® 501 and Purifloc® 601 used as above in tests.	RF-C035, RF-C410, RF-C417, RF-P408, RF-U111, RF-U136, RF-U283, ID-P200
Fluoranthrene	ARA	N/A	ARA – unknown	ARA – <i>This was found in environmental sampling at ARA; there is no indication that it was in the waste sent to the RWMC.</i>	ARA-P010
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Fluorene	ARA	N/A	N/A	<i>This was found in environmental sampling at ARA; there is no indication that it was in the waste sent to the RWMC.</i>	ARA-P010
Fluoride ion	RFO	trace	Present in the debris stream. B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of Ox-Out used in B883 for cleaning.	RF-P084
Fluorinated hydrocarbons	RFO	trace	Present in the debris stream in small amounts.	Component of Zyglo Developer ZP-9 used in B444.	RF-C215, RF-P408
Fluosilicic acid	RFO	trace	May be present in the debris stream. Coated process lines, plugged filters, and coated ion exchange resin. B771 liquid waste to B774, 741 sludge.	In B771: formed in Anion Exchange. In B444: used to strip titanium (after 1980).	RF-P084, RF-P264, RF-P408
Formaldehyde	RFO	trace	May be present in the debris stream. B559	In B559: used in the Laboratory.	RF-P085, RF-P139,

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
			liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of Bakelite used to mount metallographic samples in B444.	RF-P408, RF-U233
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Formamide	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164, RF-P408
Formic acid	RFO	trace	May be present in the debris stream. B123, B444, B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	B123, B559, B771: used in the Laboratories. Component of Cee Bee solvent used in B444. Component of Formula A Paint Remover used throughout RFP.	RF-C213, RF-P085, RF-P181, RF-P202, RF-P209, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Freon, not specific	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	Used throughout RFP. In B444: used in Non-Destructive Testing. In B771: used in degreasing.	RF-P047, RF-P058, RF-U422
Furfural	RFO	trace	May be present in the debris stream.	Alternate component (to formaldehyde) of Bakelite used to mount metallographic samples in B444.	RF-P139, RF-P408, RF-U233
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Gadolinium-148	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Gallium metal	RFO	trace	Present in the same waste streams as WR plutonium. B559, B707, B776/777, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B559: tested plutonium-gallium feed ingot for purity. In B707 and B776/777: used in delta plutonium in plutonium fabrication operations. In B771: processed through Recovery Operations. In B779: used in R&D operations and in the Pyrochemical Support Laboratory.	RF-C419, RF-P040, RF-P084, RF-P218, RF-P333, RF-P408, RF-U210, RF-U217

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Gelatin	CPP	trace	CPP - May be present in the debris stream.	CPP – Used in dissolution operations.	INTEC-P006, INTEC-U002
Glycerol (Glycerin)	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge. B771 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used as an electrolyte in etching and in the Metallurgical Laboratory. In B771: used in the preparation of metallurgical samples.	RF-C164, RF-P135, RF-P408, RF-U201
Glyceryl monolaurate	RFO	trace	Present in the debris stream.	Binding agent of Benelex® used in B559, B707, B771, B776, B777, B779, and B991 as shielding.	RF-C035, RF-P040, RF-P047, RF-P058, RF-P348, RF-P420, RF-P422
Glycol methylene ether	RFO	trace	Present in the debris stream. Present in 74A/743 sludge.	Component of Triethane used in B771 in Product and Chemistry R&D.	RF-P100, RF-P106, RF-P408
Gold metal	RFO	trace	Present in the debris stream. B444, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in plating (in solution), coating (in nitric acid), alloying, in Special Order work, and in R&D Operations. In B771: various parts of the hydrofluorinator were gold-clad (feeder tube, rabble rod) to protect against corrosion. In B779: used in the Coatings facility as a deposited coating. Used as a coating on boron nitride. In B881: used in Special Order work, in R&D Operations, and to plate parts for Inertial Fusion.	RF-P040, RF-P064, RF-P084, RF-P085, RF-P105, RF-P184, RF-P404, RF-U040, RF-U422
	ARA	trace	ARA – may be present in the debris stream.	ARA – used in ML-1 testing.	ARA-P007, PER-C001, PER-C010, PER-P004, PER-P005
	PER	trace	PER – may be present in the debris stream.	PER – Samples placed in the core of SPERT II.	
	TAN	trace	TAN – may be present in the debris stream.	TAN – plated the bottom of the SNAPTRAN-1 reactor vessel. Samples placed in the core of SNAPTRAN-2.	
Graphite (National Carbon Type CS312; AGR; Great Lakes Carbon Co. 4HLM; Stakpole Graphite Co. #331-grade)	RFO	minor	Present in the debris stream. Dissolved graphite in liquid waste from B771 to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Dissolved graphite in liquid waste from B881 to B774, 742 sludge or to the solar evaporation ponds.	In B444: used to make plutonium, enriched uranium, depleted uranium, thorium, depleted uranium alloy, beryllium casting molds and crucibles, and crucibles and molds for other metals. Noncontaminated graphite and graphite dust was sent to the landfill at RFP. In B771: in the Laboratory, used in electrodes, drying beds, and buffer material. In B707, B771 (until 1958), and B776/777: used as molds for casting plutonium (inserted inside tantalum crucibles), rods, and plungers. Graphite originally packaged and sent to B771 for scarfing to remove plutonium; later scarfed at building of origin – some molds reused. In B881: used in crucibles and molds for casting enriched uranium after 1959 until ~1965.	RF-C010, RF-C017, RF-C035, RF-C109, RF-P047, RF-P071, RF-P075, RF-P084, RF-P116, RF-P117, RF-P160, RF-P173, RF-P218, RF-P240, RF-P244, RF-P319, RF-P408, RF-U057, RF-U067, RF-U100, RF-U233

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B883: colloidal graphite used with asbestos as a lubricant when drawing beryllium. Dies, plungers, and spacers used in the formation of refractory containers for containing molten nickel and molten beryllium. Component of Lubri Bond A used in B991 in Shipping and Receiving. Component of Bakelite used to mount metallographic samples in Building 444.	
	ANL-W	trace	ANL-W – may be present in the debris stream.	ANL-W - Melt refining and oxidation molds and crucibles.	ANL-W-P001, ID-P091, INTEC-P005
	CFA	trace	CFA – may be present in the debris stream.	CFA – unknown, possibly in process development operations.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Storage of ROVER fuel elements, to Head End Process, CPP-640 for processing. Elements were burned and the ash was dissolved using nitric acid. Solution sent to CPP-601 for processing.	
Graphite, powdered	RFO	trace	Present in the debris stream. Present in the Roaster Oxide waste stream.	In B444: graphite powder used as a fire suppression material. In B123, B441, B559, B771, and B881: used in the Laboratories to make standards for analyses of calcium-lead alloy.	RF-P183, RF-U170
Gypsum	CPP	trace	CPP - May be present in the debris stream.	CPP - Absorbed liquid using gypsum.	INTEC-C001
Hafnium powder	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in the Ceramics Laboratory.	RF-P095, RF-P408
Hastelloy C (56% nickel, 5.5% iron, 15.5% chromium, 16% molybdenum)	RFO	trace	Present in the debris stream.	In B776 and B779: used in the semi-continuous molten salt extraction units.	RF-P423
mono-Heptadecylphosphoric acid	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some wastes were bottled and sent to B774 for burial in 742 sludge.	In B881: used in R&D operations.	RF-P191, RF-P192
Heat-treatment salts, not specific	RFO	trace	Present in the debris stream.	In B444 and B883: used to heat-treat (anneal, etc.) depleted uranium, depleted uranium alloys, beryllium, and other metals prior to rolling and forming. In B881 and B883: used to heat-treat (anneal, etc.) enriched uranium, beryllium, and other metals prior to rolling and forming.	RF-P117
Hexachlorobenzene	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Hexachlorobutadiene	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Hexachloroethane	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
1,1,2,3,3,3-Hexafluoro-1-propene	RFO	trace	Present in the debris stream.	Component of Viton® used as a glovebox gasket material.	RF-P420
Hexamethyldisilaxane, silica reaction product	RFO	trace	Present in the debris stream.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Hexane	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 742 sludge, 744 sludge, and/or burial in 742 sludge.	In B771: used as laboratory reagent. In B991: used in Physical Metallurgy.	RF-P084, RF-P408
Hexanol (hexyl alcohol)	RFO	trace	May be present in the debris stream. B991 liquid waste was bottled and sent to B774 for processing into 742 sludge, 744 sludge, and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
Hexavalent chromium	CPP	trace	CPP – May be present in the debris stream.	CPP – Component of Turco 4502 used to decontaminate in the cells in CPP-601 and in the calciner at the Waste Calcining Facility.	INTEC-U002
HMDZ-treated silica	RFO	trace	May be present in the debris stream in small amounts. B771 liquid waste to B774, 741 sludge.	Component of GE Antifoam 60 used in B771 in Peroxide Precipitation.	RF-P068
Hydraulic oil	RFO	trace	Present in the 74A/743 sludge. Present in the debris stream.	Used as hydraulic oil throughout RFP.	RF-U254
Hydrazine	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742-sludge.	In B771: used in Neptunium recovery as a reducing agent. In B779: in Process Development and Methods Development for recovery processes. In B881: used in the Laboratory.	RF-C227, RF-P040, RF-P085, RF-P260, RF-P333, RF-P408, RF-P421
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	
	PER	trace	PER - May be present in the debris stream.	PER - At SPERT III, added to demineralized water (to 50 ppm) to reduce the oxygen content.	ARA-U003, PER-P006
Hydrazine hydrate	CPP	trace	CPP – may be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Hydrazine sulfate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Hydriodic acid	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and in B779: used in Neptunium metal fabrication, Neptunium anion exchange and in Neptunium precipitation.	RF-C044, RF-P108, RF-P333, RF-P420, RF-P421, RF-U172

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Hydrobromic acid	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D work on incinerator ash dissolution.	RF-P162
Hydrocarbon resin	RFO	trace	Present in the debris stream.	Component of Amercoat 33 paint used throughout RFP.	RF-P106
Hydrochloric acid (HCl; Muriatic acid; 12M hydrochloric acid)	RFO	minor	May be present in the debris stream. Neutralized HCl is present in 744 sludge. B771 liquid waste to B774, 741 sludge. B123, B441, B444, B776, B779, and B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 742- or 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories, including analyses on autopsied material (B123). In B444: used in parts plating, electropolishing, and in pickling beryllium-copper alloy parts prior to electroplating. In B771: used in the Plutonium Recovery Processing, in the purification of americium oxide, in R&D operations, and in Neptunium preparation. In B776 and B779: used in the preparation of salts for Molten Salt Extraction and Electrorefining and in Electropolishing. In B779: used in Chemistry Technology, in Nuclear Joining, and plutonium hydriding. In B881: used in Enriched Uranium Recovery Operations. In B991: used in Metallurgical Operations. Component of Tuckers Etch used in beryllium-aluminum Metallurgy.	RF-C014, RF-C211, RF-C224, RF-P026, RF-P040, RF-P071, RF-P073, RF-P084, RF-P091, RF-P104, RF-P106, RF-P109, RF-P121, RF-P160, RF-P176, RF-P181, RF-P191, RF-P192, RF-P199, RF-P202, RF-P216, RF-P250, RF-P260, RF-P332, RF-P333, RF-P347, RF-P348, RF-P349, RF-P404, RF-P408, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U172, RF-U208, RF-U233
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-P001, ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-U003, PER-P011
	ARA	trace	ARA – May be present in the debris stream.	ARA – ML-1 reactor development.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – used in fuel element reprocessing and analysis.	
	NRF	trace	NRF – acids were neutralized prior to processing into Crud.	NRF – at the ECF: used in the Hot Cells; used in the Radiochemistry Laboratory.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – used in metallographic preparation. Component of Marbles.	
	TRA	trace	TRA – May be present in the debris stream.	TRA – used in etching.	

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Hydrofluoric acid (0.00N hydrofluoric acid; 0.002N hydrofluoric acid; 0.005N hydrofluoric acid; 0.01N hydrofluoric acid; 0.2N hydrofluoric acid; 0.03N hydrofluoric acid; 0.06N hydrofluoric acid; 0.12N hydrofluoric acid; 20M hydrofluoric acid; 42M hydrofluoric acid)	RFO	trace	May be present in the debris stream. B123, B444, B559, B779, B865, B881, and B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories. In B331: used to pickle thorium. In B444 and B883: used in Beryllium Metallurgy as an etchant and as a final polishing agent and used to pickle thorium. In B771: used in Plutonium Recovery Operations, in R&D operations, and in Neptunium metal preparation. In B779: used in Nuclear Joining, in Plutonium Physical Metallurgy, in R&D operations, and in the Coatings facility. In B865: used in Beryllium Etching R&D. Component of Tuckers Etch used in beryllium-aluminum metallurgy. Component of Derustit SS-3 used in B865 and B883 in development studies involving beryllium and depleted uranium.	RF-C224, RF-C227, RF-C411, RF-P027, RF-P028, RF-P040, RF-P075, RF-P084, RF-P091, RF-P104, RF-P106, RF-P108, RF-P135, RF-P162, RF-P181, RF-P202, RF-P216, RF-P224, RF-P244, RF-P260, RF-P332, RF-P333, RF-P346, RF-P347, RF-P349, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U141
	ARA	trace	ARA – May be present in the debris stream.	ARA - Used for ML-1 reactor development.	ARA-P001, ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-U003, ID-P091
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the recovery of uranium from simulated fuel elements processed in CFA-674.	
	CPP-601-4H:	trace	CCP – May be present in the debris stream.	CPP - Used in zirconium-clad fuel and graphite fuel (ROVER 1965-1984) dissolution. Used in the Laboratories. 20M HF (from a drum of 42M) used as a decontamination solution in the hot cells in CPP-601.	INTEC-P006, INTEC-P007, INTEC-U002
	NRF	trace	NRF – acids were neutralized prior to being processed into Crud.	NRF – at the ECF: used in the Hot Cells; used in the Radiochemistry Laboratory.	
	PER	trace	PER – May be present in the debris stream.	PER – Used in cleaning reactor vessel surfaces.	PER-P006, PER-P012
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in metallographic preparation. Component of Vilellas reagent.	
	TRA	trace	TRA – May be present in the debris stream.	TRA – Used in etching.	
<i>hydrogen fluoride, Anhydrous</i>	<i>RFO</i>	<i>N/A</i>	<i>Uncontained gas.</i>	<i>In B771: used in the hydrofluorinator to convert plutonium oxide to plutonium tetrafluoride.</i>	<i>RF-U040, RF-U141</i>

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Hydrogen peroxide (30%, 35% and 50%)	RFO	minor	May be present in the debris stream. B122 liquid waste to the solar evaporation ponds. B444, B779, and B881 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B771 liquid wastes to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B122: used for personnel decontamination. In B123: used during analyses of autopsied material. In B444: used in ultrasonic etching. In B771: used in Peroxide Precipitation, in the purification of americium oxide, and in R&D operations. 50% hydrogen peroxide used from 1953 to 6/1957, 35% hydrogen peroxide used thereafter. In B779: used in R&D operations and in Process Chemistry Technology. In B881: used in Peroxide Precipitation for Enriched Uranium Recovery, in the preparation of U-235, and in the Laboratory.	RF-C211, RF-C224, RF-P026, RF-P040, RF-P058, RF-P068, RF-P073, RF-P084, RF-P085, RF-P091, RF-P108, RF-P176, RF-P199, RF-P332, RF-P333, RF-P346, RF-P408, RF-P420, RF-U141
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	
	ARA	trace	ARA – May be present in the debris stream.	ARA – Used in ML-1 reactor development.	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-U003
Hydroquinone	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Developer and Kodak Industrex Developer Replenisher used by NDT in B444 and B883.	RF-C215, RF-C216, RF-P084, RF-P408
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W – Source document did not specify a use.	ARA-P008
Hydrotreated light naphthenic petroleum distillates	RFO	trace	Present in 74A/743 sludge. Present in the debris stream.	Component of Texaco Almag oil used in the spark machining of beryllium in B444.	RF-C227, RF-P408, RF-U287
Hydrotreated light petroleum distillate	RFO	trace	May be in the debris stream in small amounts.	Component of DP-50 Dye Penetrant (Dubl-Chek) used in B444 for parts inspection.	RF-C215
Hydrotreated residual oils (petroleum)	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	Component of Texaco Thuban 140 used in flammability studies in B779.	RF-P332
	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Release 1 VOC spilled in the SDA and cleaned up during excavation.	ID-C202

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Hydroxyacetic acid	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Lime-A-Way used in R&D studies in B779.	RF-P422
Hydroxylamine hydrochloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation pond. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in Neptunium metal preparation. In B771 and B779: Used in R&D operations. In B881: used in the Laboratory as a reagent.	RF-C044, RF-C411, RF-P084, RF-P106, RF-P108, RF-P222, RF-P333, RF-P408, RF-P420, RF-P421, RF-U172
Hydroxylamine nitrate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in Neptunium precipitation and anion exchange and in the recovery of plutonium from lead-plutonium alloys.	RF-P085, RF-P260, RF-P408, RF-P423
Hydroxylamine sulfate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory and in R&D operations.	RF-P073, RF-P106, RF-P408
tris-Hydroxymethylamino methane	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P246, RF-P408
2-Imidazolidinethione (Ethylene thiourea)	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Inconel (nickel-chromium-iron alloy)	RFO	trace	Present in the debris stream.	In B771: construction material for various parts of the hydrofluorinator (feeder tube, reactor tube, etc) and the off-gas system. In B881: used in boats and various parts of the hydrofluorinator.	RF-P260, RF-U040
Indium metal	RFO	trace	May be present in the debris stream.	Indium foil was used in dosimeters and in plant security badges. Analyzed in B123 from 1958.	RF-P105, RF-P413

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Iodine	RFO	trace	May be present in the debris stream. In B771, consumed in the process. Any remaining in the SS&C was processed in B771/B881 to recover the metal. B771 liquid waste to B774, 741 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B779 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in thermite reduction (Am, Np, Cm-244, U-233, U-236, Pu-242, and Pu-239) and in R&D operations. In B779: used in R&D operations. In B881: used in thermite reduction (EU) and in the Laboratory.	RF-P091, RF-P040, RF-P084, RF-P224, RF-P260, RF-P333, RF-P346, RF-P348, RF-P408, RF-P419, RF-P420, RF-P421, RF-P423
	ANL-W	trace	May be present in the debris stream.	ANL-W – melt refining contaminant	ANL-W-P001
Iodine cyanide (Cyanogen iodide)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P423
Iron-chromium-yttrium alloy	TAN	trace	TAN – May be present in the debris stream.	TAN – Used as cladding for some of the fuel elements used in the HTRE reactors.	TAN-P080
Iron metal	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B551: scrap iron piles were maintained for recycle. Occasionally the piles were cross contaminated with depleted uranium from B444 and had to be disposed to INL. In B779: used in a general machining shop supporting Joining Technology for the manufacture of tools, fixtures, and special order parts; also included on an excess chemical list.	RF-P040, RF-U033
Iron oxide	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB used in coating studies in TAN607.	TAN-P092
Iron sulfide	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: included on an excess chemical list.	RF-P040
Isobutyl alcohol	CPP	trace	CPP – may be in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Isopropanol (Isopropyl alcohol)	RFO	trace	May be present in the debris stream. B122, liquid waste to the solar evaporation ponds. B123, B444, B707, B776/777, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B991 waste and some laboratory waste was bottled and sent to B774 for processing into 742-, or 742 sludge and/or burial in 742 sludge.	In B122: used for personnel decontamination. In B123, B441, B559, B771, and B881: used in the Laboratories. In B444: used for cleaning depleted uranium parts prior to assembly, welding, and brazing. In B771: used in Plutonium Metallurgical R&D. In B707: used for compressor cleaning. In B776/777: used in cleaning activities.	RF-C044, RF-C213, RF-C215, RF-C224, RF-C226, RF-C406, RF-P040, RF-P084, RF-P085, RF-P102, RF-P108, RF-P160, RF-P181, RF-P240, RF-P346, RF-P408, RF-P422, RF-U242

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	TAN	trace	TAN – May be present in the debris stream.	<p>In B779: used in Nuclear Joining, Plutonium Physical Metallurgy, and in sample preparation for x-ray analysis, plutonium metallurgy, and tensile testing.</p> <p>In B991: used in inspection of completed parts.</p> <p>Component of Noxon metal polish, used in B444 for cleaning beryllium parts.</p> <p>Component of Formula A Paint Remover used throughout RFP.</p> <p>Component of GS-3 used in B444 as a gasket sealant.</p> <p>Component of Sani-Phene and Winterphene used in B881 in coolant to kill bacteria.</p> <p>Component of Spot 'N Glaze putty used in B881.</p> <p>Component of Kerful used in R&D studies in B779.</p> <p>Component of Bon Ami used in stress corrosion cracking tests on depleted uranium-niobium alloy.</p>	TAN-P092
Isopropylbenzene (Cumene)	CPP	trace	CPP - May be present in the debris stream.	CPP – Used in the Laboratories.	ARA-P013, ID-P088, INTEC-P007
	TRA	trace	TRA – May be present in the debris stream.	TRA - Component of Dowtherm J used as a heat transfer fluid.	
Kaolin (clay)	RFO	trace	May be present in the debris stream.	Component of Spot 'N Glaze Putty used in B881.	RF-C226, RF-P408
	TAN	trace	TAN - May be present in the debris stream.	<p>TAN - Component of Amercoat 78HB and Amercoat 66 used in coating studies in TAN607.</p> <p>Component of Devran 4170 and Devran 4170 Converter used in coating studies in TAN607.</p>	TAN-P092
Kerosene	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B779, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge drums.	<p>In B444 and B779: used in Metallurgical operations.</p> <p>In B771: used by Special Recovery in plutonium-uranium solvent extraction.</p> <p>In B777: paraffin-kerosene used in the Plutonium Metallography Laboratory to thin diamond paste for polishing.</p> <p>Component of BP Dielectric 200 Fluid used in B444 in Electric Discharge Machining.</p> <p>Component of Varsol® used in B881 in enriched uranium R&D operations, in B444 in Metallurgical operations, and in B779 in sample preparation for x-ray analysis, tensile testing, and plutonium metallurgy.</p>	RF-C215, RF-C227, RF-P040, RF-P084, RF-P106, RF-P408, RF-P419

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	CPP	trace	CPP – May be present in the debris stream.	CPP - Kerosene was used extensively in solvent extraction process.	ANL-W-P009, ARA-P007, ARA-P008
Ketone-based solvent	NRF	trace	NRF - May be present in the debris stream. May be present in solidified waste.	NRF – used at the ECF in the Decontamination Shop.	NRF-C031
Lanthanum metal	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B559, B779, B865, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444, B771, B779, B881, B865: used as a coating on boron nitride in metallurgy. In B771 and B779: used in R&D operations. In B123, B441, B559, B771, and B881: used in the Laboratories in the analysis of calcium-lead alloy.	RF-P183, RF-P184, RF-P422, RF-P408
Lanthanum nitrate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B123, B441, B559 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories in the standard used in the analyses calcium-lead alloy.	RF-P183, RF-P408
Lead-210	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Lead acetate	RFO	trace	May be present in the debris stream. B444 and B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations. In B444: used in Physical Metallurgy.	RF-P085, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Lead-based paint	RFO	trace	Present in the debris stream.	Lead-based paint used throughout RFP.	RF-P064, RF-P085
Lead chloride	RFO	trace	May be present in the debris stream. B444 and B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations. In B444: used in Physical Metallurgy.	RF-P085, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Lead fluoroborate	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in Physical Metallurgy and plating operations.	RF-P085, RF-P408
Lead metal	RFO	minor	Present in the debris stream. B444, and B447 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	<p>In B444: used in casting by Physical Metallurgy, in Special Order work, in R&D Operations, in Tool and Gauge Machining, and in plating operations.</p> <p>In B447: used in casting and back machining.</p> <p>In B771: used in fixed and mobile shielding.</p> <p>In B774: used in rolling shielding.</p> <p>In B776/777: 18 drums of contaminated lead were removed from the maintenance area in B776 after the 1969 fire and shipped as waste.</p> <p>In B881: used in Special Order work and in R&D Operations.</p> <p>In B883: used in Rolling and Forming (routinely 1/2"- thick hemi-shells were formed).</p> <p>In B991: the inside of final product shipping containers was covered with lead.</p> <p>Shielding, lead bricks, lead sheets, lead glovebox parts, and welding rods throughout RFP.</p> <p>Component of Prestolite Lead Acid Batteries.</p>	RF-C109, RF-C123, RF-C224, RF-P040, RF-P041, RF-P047, RF-P057, RF-P058, RF-P059, RF-P060, RF-P063, RF-P064, RF-P084, RF-P085, RF-P091, RF-P092, RF-P093, RF-P094, RF-P095, RF-P181, RF-P183, RF-P404, RF-P408, RF-U040, RF-U069, RF-U115, RF-U124, RF-U152, RF-U167
	ANL-W	trace	ANL-W – Present in the debris stream.	ANL-W – Used as shielding at the BORAX III, IV, and V reactors.	ANL-W-P009, ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-P009, ARA-P010, ARA-U001, ARA-U003, ID-P091, INTEC-C001, NRF-C031, PER-P006, PER-P012, TAN-P079, TAN-P086, TAN-P092
	ARA	trace	ARA – Present in the debris stream.	ARA – Used in ML-1 reactor development.	
	CFA	trace	CFA – Present in the debris stream.	CFA – Used as shielding	
	CPP	trace	CCP – Present in the debris stream.	CCP – Used as shielding	
	NRF	trace	NRF – Present in the debris stream.	NRF – Lead sheeting and bricks were a commonly used shielding material.	
	PER	trace	PER – Present in the debris stream.	PER – Used for reactor shielding at SPERT III and ion chamber shielding at SPERT II. Used in explosive fuses tested for use in the Aircraft Nuclear Propulsion reactors.	
	TAN	trace	TAN – Present in the debris stream.	TAN – Used in the shielding in the reactor for HTRE-3 and used in shielding for cameras used during the SNAPTRAN-2 experiment.	ID-P091, ID-U297, ID-U298, RF-U067

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	Rockwell ATI Division	trace	ATI – Present in the debris stream.	Lead was used in reactor development. Lead casks were used as shipping containers, sometimes inside other shipping containers.	
Lead nitrate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B123, B441, B559 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories in the analyses of calcium-lead alloy.	RF-P183, RF-P408
Lead oxide	RFO	trace	May be present in the debris stream. B444 and B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations. In B444: used in Physical Metallurgy.	RF-P085, RF-P408
Lead peroxide	RFO	trace	Present in the debris stream.	Component of Prestolite Lead Acid Batteries.	RF-C224
Lead-plutonium alloy	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771, received from LRL for the recovery of the plutonium.	RF-P423
Lead powder	RFO	trace	Present in the debris stream. B123, B441, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratories. Lead shot was used to formulate lead standards used in analyses. In B705: used in Ceramics manufacture. Component of Led-Plate Anti-Seize Compound used in B779.	RF-P040, RF-P095, RF-P181, RF-P408
Liquefied petroleum gas	RFO	trace	Present in the debris stream.	Component of DP-50 Dye Penetrant (Dubl-Chek) used in B444 for parts inspection.	RF-C215
Lithium-aluminum hydride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P408, RF-P423
Lithium borate	RFO	trace	May be present in the debris stream.	In B779: used in vitrification studies.	RF-P349

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Lithium carbonate	RFO	trace	Present in the debris stream. B444, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Most B444, B865, and B883 (depleted uranium) salts were drummed and shipped to INL.	In B881 and B883: used extensively in eutectic salt baths for heating enriched uranium prior to rolling. Waste salt was sent to Carbonate Salt Dissolution for enriched uranium recovery. In B444, B865, and B883: used extensively in eutectic baths prior to rolling depleted uranium. Most waste salts were drummed and shipped to INL. Component of Holden 660 Mixture used in B444 and B883 for heat-treating depleted uranium.	RF-P063, RF-P072, RF-P084, RF-P260, RF-P408
Lithium chloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 742 waste. B776/777 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory and in R&D operations. In B776/777: component of Kathene used in the air drying system. In B779: used in the reduction of plutonium dioxide.	RF-P084, RF-P408, RF-P419, RF-P421, RF-P423
Lithium fluoride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the fluidized bed fluorinator in lab-scale, pilot-scale, and production-scale operations.	RF-P408, RF-P419
Lithium hydride	Rockwell ATI Division	trace	ATI - Present in the debris stream.	ATI - Used as shielding during reactor development.	ID-P091, ID-U297, ID-U298
Lithium metal	RFO	trace	B444, B777, B779, B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. There was a lithium disposal area (reactive metals disposal) for non- or low-contaminated lithium through 1968. Contaminated lithium was reacted using butanol or xylene through at least December, 1968. Lithium-contaminated oils were also reacted. Reacted materials may have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in R&D operations. In B444, B777, and B881: used in machining for special order work. In B776/777 and B779: used in the fabrication of special devices for LRL. Health Physics arranged the manufacture of lithium foil for use in the Neutrometer for use by AEC facilities.	RF-P064, RF-P084, RF-P106, RF-P114, RF-P408, RF-P419, RF-U046, RF-U124, RF-U128, RF-U152, RF-U294
Lithium oxide	RFO	trace	Present in the debris stream.	Present in the SDA from batteries generated at RFP.	ID-P109
Lithium perchlorate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Chemistry Technology in a study of the reaction plutonium and xenon trioxide.	RF-P408, RF-U208

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Lithium salts, not specific	RFO	trace	May be present in the debris stream. B444 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. Contaminated coolants may have been bottled and sent to B774 for processing into 74A/743 or 744 sludge.	In B444: lithium salt fabrication was performed in a manner similar to depleted uranium from 1961 to 1963.	RF-P084, RF-P240
Lutetium oxide	RFO	trace	May be present in the debris stream.	In B779: included in an excess chemical list.	RF-P040, RF-P408
Lutetium powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in the Ceramics Laboratory. In B779: included in an excess chemical list.	RF-P040, RF-P095, RF-P408
Magnesia Cement	RFO	trace	Present in 744 sludge. Present in the debris stream.	Used in the plutonium buildings as an absorbent in waste containers. In B774: used in 744 sludge.	RF-C415, RF-P408, RF-U152, RF-U294
<i>Magnesium-aluminum alloy</i>	<i>RFO</i>	<i>trace</i>	<i>Should not be in buried waste.</i>	<i>In B779: in 1974 used in R&D operations in attempts to cleanup americium recovery salts (recover plutonium and americium from molten salt residues and Direct Oxide Reduction salt residues); never implemented due to inability to its incompatibility with existing aqueous processing. A second R&D development program was initiated in 1982. A production demonstration campaign was initiated in actual production equipment. Salt Scrub process began operation in November, 1983.</i>	<i>RF-P414</i>
Magnesium-aluminum-zinc-manganese alloy	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B776 and B707: conveyor pendants were constructed of this alloy, in different percentages. In B771: the Process Chemistry R&D group performed thermogravimetric tests on conveyor pendants in May 1969. In B779: the Equipment and Material Test Laboratory R&D group performed burn tests on some of the pendants in May 1969.	RF-U025
Magnesium carbonate	RFO	trace	Present in the debris stream. B444, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Most B444, B865, and B883 (depleted uranium) salts were drummed and shipped to INL.	In B881 and B883: a component of the eutectic salt mixture used to heat enriched uranium prior to rolling; salts were processed through Carbonate Salt Dissolution to recover the enriched uranium. In B444, B865, and B883: a component of the eutectic salt mixture used to heat Depleted Uranium prior to rolling. Most of the salts were drummed and shipped to INL.	RF-P072, RF-P161, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Magnesium chloride	RFO	trace	May be present in the debris stream. Salts from the molten salt process were treated in americium recovery in B771. Waste from electrorefining was processed through plutonium recovery operations in B771. B771 liquid waste to B774, 741 sludge. B776 and B779 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds.	In B771 and B779: used in R&D operations. In B771/776/779: component of the salt used in molten salt extraction and in electrorefining (Chemistry Technology).	RF-C224, RF-C227, RF-P104, RF-P109, RF-P116, RF-P121, RF-P137, RF-P260, RF-P262, RF-P332, RF-P333, RF-P346, RF-P348, RF-P408, RF-P422, RF-U141
Magnesium fluoride	RFO	trace	B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in reduction of plutonium dioxide.	RF-P408, RF-P423
Magnesium-lead alloy	RFO	trace	May be present in the debris stream. May have been sent to B771 for recovery of plutonium and americium or may have been transferred to Savannah River Site for recovery. B771 liquid waste to B774, 741 sludge.	In B779: used in R&D operations to scrub americium recovery salts (recover plutonium and americium from molten salt residues).	RF-P422
Magnesium metal	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in Physical Metallurgy and in Metallurgical Operations. In B771: magnesium metal used in R&D operations and in thermite reduction. In B779: magnesium was used in R&D operations, in the Pyrochemical Technology Support Laboratory, and in Evaporative Separations.	RF-C211, RF-P040, RF-P084, RF-P085, RF-P091, RF-P105, RF-P262, RF-P348, RF-P408, RF-P422
	PER	trace	PER – May be present in the debris stream.	PER - Destructive testing of reactor components. Used to simulate voids in the SPERT I reactor.	ID-P091, PER-P004, PER-P011, PER-P027
Magnesium oxide	RFO-DOW-3H, uncemented sludge	trace	Present in the debris stream. Present in 741-, 742-, and 744 sludges. B771 liquid waste to B774, 741 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used as a heat-sink material and in crucibles for (U-233, Np, Cm-244, EU, and Pu) Thermite Reduction; processed in plutonium recovery. In B771/776/779: early Molten Salt Extraction work used in crucibles. In B776 and B779: used in crucibles in the electrorefining process. In B881: used in crucibles in the foundry (until 1959), in Thermite Reduction, and as ceramic liners; also used to coat inside surfaces of the bomb reactor vessel.	RF-C035, RF-C415, RF-C227, RF-P064, RF-P084, RF-P091, RF-P109, RF-P162, RF-P260, RF-P333, RF-P349, RF-P404, RF-P408, ID-P109

Component of magnesia cement (85% - 15% asbestos), used

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				throughout RFP as an absorbent. Component of Portland cement used throughout RFP as an absorbent.	
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – a melt refining insulation.	ANL-W-P001
	PER		PER – May be present in the debris stream.	PER – used as an insulation in reactors.	PER-P008
Magnesium perchlorate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the solution for the Laboratory scrubber.	RF-P106, RF-P408
Magnesium powder	RFO	trace	May be in the debris stream in small amounts. B771 liquid waste to B774, 741 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B771: magnesium powder used in R&D operations and in Thermite Reduction. In B705: used in the Ceramics Laboratory.	RF-P095, RF-P348
Magnesium silicate (Talc)	RFO	trace	Present in the debris stream. B444, B776, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Zyglon ZP9 used by NDT in B444, B776, and B881. Component of Glyptal Alkyd used by NDT in B444, B776, and B881. Component of Spot 'N Glaze Putty used in B881. Component of Bakelite used to mount metallographic samples in B444.	RF-C224, RF-C226, RF-C408, RF-P139, RF-P408, RF-U233
	TAN	trace	TAN - May be in the debris stream.	TAN - Component of Amercoat 78HB and Amercoat 66 used in coating studies at TAN607. Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Magnesium sulfate	RFO	trace	May be present in the debris stream. Present in the 741- and 742 sludges. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge.	B774: reagent used in 1 st and 2 nd Stage Precipitation processes. In B771 and B779: used in R&D operations.	RF-C224, RF-P047, RF-P108, RF-P260, RF-P262, RF-P408, RF-P420, RF-U115, RF-U136, ID-P200
Magnesium-zinc alloy	RFO	trace	May be present in the debris stream. May have been sent to B771 for recovery of plutonium and americium or may have been transferred off-Site for recovery. B771 liquid waste to B774, 741 sludge.	In B771 and B779: used in R&D operations to scrub americium recovery salts (recover plutonium and americium from molten salt residues and Direct Oxide Reduction salt residues); used as a scrub alloy and to remove plutonium from salts used in the reduction of plutonium dioxide.	RF-P200, RF-P332, RF-P347, RF-P349, RF-P420, RF-P422, RF-P423
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W - Liquid metal reclamation of melt refining skulls.	ANL-W-P001
Magnesium zirconate	RFO	trace	May be present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge,	In B444 and B881: used in Metallurgical Operations, possibly as a crucible coating material.	RF-C227, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
			or to the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.		
Magnesocene, sublimed [bis(cyclopentadienyl) magnesium]	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. Possibly bottled and sent to B774, 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations, possibly used as a catalyst.	RF-P422, RF-P423
Maleic anhydride	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Malonic acid	RFO	trace	May be present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in beryllium metallurgy as an etchant. In B881, used in Enriched Uranium Recovery precipitation operations (ended 1964).	RF-P084, RF-P216, RF-P260
Medium aliphatic petroleum solvent	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Aqua-Sol used in R&D studies in B779.	RF-P422
Mercuric chloride	RFO	trace	May be present in the debris stream. Contaminated liquid wastes to B774; 741 sludge, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge or burial in 742 sludge.	Source document does not include usage or building(s) where used.	RF-C208
Mercuric oxide	RFO	trace	May be present in the debris stream. Contaminated liquid wastes to B774; 741 sludge, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge or burial in 742 sludge.	Source document does not include usage or building(s) where used.	RF-C208

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Mercury metal	RFO-DOW-3H, uncemented sludge	trace	Present in the debris stream. Mercury batteries and contaminated mercury in bottles were occasionally disposed in 742 sludge drums. B123, B441, B444, B559, B779, and B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Dirty, non-contaminated mercury was recycled in the B881 Laboratory. Non-contaminated mercury batteries were recycled to an off-site contractor (late 1960s).	<p>In B123, B441, B559, B771, B881: used in the Laboratories.</p> <p>In B125: used to determine accurate volumes.</p> <p>In B334: a spill from an unknown source was cleaned up.</p> <p>In B441 and B551: spills were cleaned up.</p> <p>In B444: used in Physical Metallurgy.</p> <p>In B551: mercury spill was cleaned up using a filtered vacuum pickup and sulfur powder.</p> <p>In B779: used in Joining, in R&D testing of MSE extractor pumps, a spill occurred, and was included on an excess chemical list.</p> <p>In B881: some material containing mercury was heated in the furnace to produce mercury vapor – no additional information and a spill occurred in the Laboratory and was cleaned up.</p> <p>In B881: a mercury recovery still for non- and lightly-contaminated mercury was operated.</p> <p>In the Laboratories, 7 ml was used as a working electrode for some processes.</p> <p>Used in plant instruments such as: Jones reducers, thermometers and barometers, plant machinery, alkaline batteries, dry cell batteries, standard batteries, mercury batteries, calomel electrodes, mercury manometers, plumb bobs, diffusion pumps, mercury switches, mercury relays, thermometers, thermoregulators, welder contacts, mercury vapor lights, sodium vapor lights, fluorescent lights, and in experimental apparatus.</p>	RF-C045, RF-C208, RF-C209, RF-C224, RF-P040, RF-P057, RF-P058, RF-P059, RF-P060, RF-P064, RF-P084, RF-P085, RF-P086, RF-P093, RF-P181, RF-P408, RF-P423, RF-U120, RF-U121, RF-U124, RF-U152, RF-U243
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the processing of simulated fuel elements and uranium extraction and in the calciner in CFA-674.	
	CPP	trace	CPP - May be present in the debris stream.	CPP – Used in the Laboratories.	ANL-W-P009, ARA-P009, ARA-U003, INTEC-P007
	TAN	trace	TAN – May be present in the debris stream.	TAN – Found in underslab sampling of the Decontamination Room Sump in TAN607. May have come from the HTRE units. TAN-620 lists spills from HTRE units when in storage.	
	Rockwell ATI Division	trace	ATI - May be present in the debris stream.	ATI - Used in reactor development.	ID-P091, ID-U297, ID-U298

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Mercury nitrate (mercuric nitrate)	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations.	RF-P085, RF-P408
	CFA	trace	CFA – May be present in the debris stream.	CFA – used in the recovery of uranium from simulated fuel elements in CFA-674.	ARA-U003, INTEC-P006
	CPP	trace	CPP - May be present in the debris stream.	CPP – used as a catalyst.	
Mercury/thallium	RFO	trace	May be present in the debris stream.	Source document does not include usage or building(s) where used.	RF-C208
Mercury vapor	RFO	trace	Present in the debris stream.	In B881: some material containing mercury was heated in the furnace to produce mercury vapor – no additional information. Mercury vapor, sodium vapor, and fluorescent lights were used throughout RFP. Mercury rectifiers were used at RFP.	RF-C045, RF-C208, RF-P057, RF-P058, RF-P059, RF-P060, RF-P181, RF-U060, RF-U121, RF-U152
Methachlor	CPP	trace	CPP - May be present in the debris stream.	CPP - used to wipe down fuel casks.	INTEC-C001
Methanol (Methyl alcohol)	RFO-DOW-3H: Uncemented sludges	trace	Present in the debris stream. B123, B441, B444, B559, B779, B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and processed to 744 sludge and/or burial in 742 sludge.	B123, B441, B559, B771, and B881: used in the Laboratories. In B441 and B444: used in beryllium laboratory analysis. In B444: used in Joinings and Coatings and in the Metallurgical Laboratory. In B771: used R&D operations. In B779: used in the Coatings facility, in Product Physical Chemistry, and in R&D operations. Used to clean glovebox windows throughout RFP. Component of Loctite Pipe Sealant used in B444.	RF-C164, RF-C224, RF-C227, RF-C406, RF-P040, RF-P084, RF-P086, RF-P112, RF-P167, RF-P181, RF-P408, RF-P419, RF-P420, RF-P424
	ARA	trace	ARA – May be present in the debris stream.	ARA602 – used in welding qualification. ARA606 – used as a solvent. ARA626 – used as a solvent. ARA627 – used in the Hot Cell and Laboratory as a solvent.	ARA-P010, ARA-U003, ID-P091, INTEC-P007
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	
Methyl acetoacetate	RFO	trace	May be present in the debris stream. B991 liquid waste bottled and sent to B774 for processing into 742 sludge, 74A/743-, or 744 sludge, and/or burial in 742 sludge.	In B991: used as a solvent in Physical Metallurgy.	RF-P084
Methyl n-amyl ketone	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB and Amercoat 66 used in coating studies in TAN607. Component of Chemfast 547 used in coating studies in TAN607.	TAN-P092

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
p-(methylamino) phenol sulfate	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Developer used in B444 in NDT operations.	RF-C215, RF-P084, RF-P408
Methyl 2-cyanoacrylate	RFO	trace	Present in the debris stream.	Component of Eastman 910 Adhesive used in B444 and B883 NDT.	RF-C212
3-methylcyclohexanol	RFO	trace	May be present in the debris stream. B991 waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084, RF-P408
Methylene bromide (dibromomethane)	RFO	trace	Present in the debris stream. B776 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B776: used in the float-sink process.	RF-U152
Methylene chloride (dichloromethane)	RFO-DOW-3H: Uncemented sludges RFO-DOW-4H: Combustibles RFO-DOW-6H: Filters RFO-DOW-9H: Metals RFO-DOW-12: Particulate waste	trace	May be present in the debris stream. Present in the 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B123, B441, B444, B559, B779, B881 waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratory for sample preparation and analysis. In B444: used in degreasing depleted uranium after quenching. In B779: used in Physical Metallurgy and Nuclear Joining. In B771 and B779: used in R&D operations. Component of paint and strippers used throughout RFP. Component of Ram GS-3, unknown use. Component of Formula A Paint Remover. Component of Magnaglo and Dubl-Chek. Component of Cee Bee solvent, used in B771 for parts cleaning. Component of Snopake®, used for an unknown purpose.	RF-C213, RF-C214, RF-C406, RF-C408, RF-C411, RF-P040, RF-P084, RF-P085, RF-P423, RF-U115, RF-U406
	CPP	trace	CPP – May be present in the debris stream.	CPP – Found in sampling at the solvent burner site. Used in the Laboratories.	ARA-P009, ARA-P010, ARA-U003, INTEC-P006, INTEC-P007
	TRA	trace	TRA – May be present in the debris stream.	TRA602, 632, and 653 – Used as a degreasing solvent.	
4,4-methylene-bis (2-chloroaniline) (MOCA)	RFO	trace	May be present in the debris stream. Possibly buried in B774, 744 sludge.	Chemical is MOCA resin hardener, a component of Create-A-Mold 3D Molding Compound possibly used in B444. This was buried in a non-targeted waste form and was removed from final chemical table in the AK document after round-table discussion with Client personnel.	RF-P047, RF-P064, RF-P084, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Methylene diphenyl 4,4'-diisocyanate	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Chemglaze Urethane Aluminum Z652 tested as a coating to prevent stress corrosion cracking on depleted uranium-niobium alloy in B881.	RF-U242, RF-P408
Methyl ethyl ketone (2-butanone; MEK)	RFO	trace	Present in the debris stream. B444, B776, B779, and B881 liquid wastes to B774, 742 sludge or to the solar evaporation pond. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. In B779: used in Physical Metallurgy and Nuclear Joining. Common constituent in paint thinner used throughout RFP. Component of Amercoat 33 paint. Component of Glyptal 1511N Thinner and Glyptal Red Insulating Enamel used in B444, B776, and B881 in NDT. Component of Velcro adhesive used in B881	RF-C164, RF-C218, RF-C226, RF-C406, RF-P040, RF-P106, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	
	PER-601-1H: Combustibles	trace	PER – May be present in the debris stream.	PER – Used as a solvent.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Devran 4170 used in coating studies in TAN607. Component of Plasite 7155 used in coating studies in TAN607.	ID-P091, INTEC-P007, TAN-P092
Methyl iodide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Methyl isobutyl ketone (Hexone; MIBK)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Common constituent in paint and paint thinner used throughout RFP. Component of Amercoat 33 paint.	RF-C164, RF-C407, RF-P106, RF-P408
	ARA	trace	ARA – May be present in the debris stream.	ARA – Source documents did not specify a use.	ARA-P010, ID-P091, INTEC-P001, INTEC-P005, INTEC-P006, INTEC-P007, INTEC-U002, TAN-P092
	CPP-601-5H: Organic solvents	trace	CPP – May be present in the debris stream.	CPP – Used in continuous solvent extraction for aluminum-clad fuels and in 2 nd , 3 rd , and 4 th cycle solvent extraction for zirconium-clad fuels. Used in the Laboratories as a solvent. Used in Neptunium Recovery operations in CPP-601.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Amercoat 66 used in coating studies at TAN607. Component of Devran 4170 used in coating studies in TAN607. Component of Phenoline 302 Part B used in coating studies in TAN607.	
Methyl methacrylate	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
n-Methylmorpholine	RFO	trace	Present in the debris stream. Present in 74A/743 sludge.	Used as an inhibitor in perchloroethylene.	RF-C035
Methyl naphthalene	ARA	N/A	N/A	Found during environmental sampling at ARA. No indication that this was disposed in the waste stream.	ARA-P010

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Methyl orange (sodium salt of sodium p-dimethylamino azobenzene sulfonate acid)	RFO	trace	May be present in the debris stream. B441 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B441 and B881: used in the Laboratories as a pH indicator.	RF-P072
4-methyl-2-pentanol	RFO	trace	Present in the debris stream.	Component of Dow Corning 557 Silicone Dry Film Lubricant used in B444 in Assembly Testing.	RF-P084, RF-P408
1-methyl-2-propanol	RFO	trace	Present in the debris stream.	Component of GS-3 used as a gasket sealant in B444.	RF-C215, RF-P408
Methyl salicylate (Wintergreen oil)	RFO	trace	May be present in the debris stream. Present in the 74A/743 sludge.	Component of Sani-Phene and Winterphene used in B881 to kill bacteria in coolant.	RF-C215, RF-P408
Mica	RFO	trace	Present in the debris stream.	Component of Amercoat 33 paint used throughout RFP.	RF-P106, RF-P408
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Mineral oil	RFO	trace	May be present in the debris stream. Present in 74A-743 sludge. B444, liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of Cimcool used in B444 as a D-38 machining coolant.	RF-P084, RF-P408
Modified aliphatic polyamine	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure used in coating studies in TAN607.	TAN-P092
Molybdenum carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Molybdenum metal	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining operations. B444 and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B444: used in Physical Metallurgy and in Alloying. In B779: used in the Coatings facility as a film and as a coating on boron nitride.	RF-P085, RF-P095, RF-P184
	Rockwell ATI Division	trace	May be present in the debris stream.	Used as a fuel alloy during reactor development.	ID-P091, ID-U297, ID-U298
Molybdenum powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in the Ceramics Laboratory. In B779: used in the Coatings facility and included on an excess chemical list.	RF-P040, RF-P095, RF-P404, RF-P408
Molybdenum sulfide (Molybdenum disulfide)	RFO	trace	May be present in the debris stream.	Component of Molykote and MolyDee used in B444. Component of Lubri Bond A used in B991 in Shipping and Receiving.	RF-C215, RF-P084, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Monel (nickel-copper alloy w/traces of C, Mg, Fe, S, Si)	RFO	trace	Present in the debris stream. Present in the 74A/743 sludge from machining operations.	In B444: used in production of parts. In B771: construction material of valves, fitting, lines, filter boats, components of the hydrofluorinator, and the hydrofluorinator offgas system; used in the fluidized bed fluorinator. In B777: used in pit components in Assembly Operations. In B881: used in filter boats in the conversion and reduction steps of Enriched Uranium Recovery operations.	RF-P064, RF-P084, RF-P091, RF-P348, RF-P419, RF-U038, RF-U040, RF-U141, RF-U124
Monocyclic terpene	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Aqua-Sol used in R&D studies in B779.	RF-P422
Morpholine	RFO	trace	Present in 74A/743 sludge. May be in debris stream.	Used as an inhibitor in Chlorothene.	RF-P106, RF-P408, RF-U100
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003
Naphtha (high flash naphtha)	RFO	trace	Present in the debris stream.	Component of Formula A Paint Remover used throughout RFP.	RF-C213, RF-C226, RF-P408
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB used in coating studies in TAN607. Component of Amercoat 78HB Cure used in coating studies in TAN607. Component of Chemfast 547 used in coating studies in TAN607.	TAN-P092
Naphthalene	RFO	trace	Present in the debris stream.	Component of Formula A Paint Remover used throughout RFP. Component of Varsol 1® solvent.	RF-C213, RF-P408, ID- U297
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Naphthenic acid, crude	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful, used in R&D studies in B779.	RF-P422
Naphthenic mineral oil	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408
Natural uranium	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in simulated fuel elements which were processed for uranium recovery in CFA-674. Also processed through a calciner at CFA-674.	ARA-U003

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Neoprene	RFO	trace	Present in the debris stream.	In B771: inadvertently used as gasket material for a hydrogen peroxide tank that was subsequently destroyed. In B776: in gloves used in the float-sink process by NDT. Possibly used as gasket material in other situations.	RF-P408, RF-U040, RF-U152
Neptunium dioxide	RFO	trace	Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Used as a standard in the Laboratory.	RF-U243
Neptunium metal	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B776, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: alloyed with depleted uranium in the Metallurgical Laboratory. In B771, B776, B779, and B881: used in Special Order work. In B771: processed in the analytical laboratory.	RF-P064, RF-P084, RF-P260, RF-P264, RF-P333, RF-P408, RF-P420, RF-U021, RF-U243
	CPP	trace	CPP – May be present in the debris stream.	CPP – Neptunium recovery performed by the CPP Production Branch in CPP-601 (at least 8/1965 – 1/1966).	INTEC-U002
Neptunium nitrate	RFO	trace	B123, B441, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, and B881: used in the Laboratory.	RF-U243
Neptunium oxide	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771: received from Savannah River for conversion to Neptunium metal and high purity neptunium oxide prepared for ORNL.	RF-P117, RF-P421
Nichrome (Nickel-chromium alloy)	TAN	trace	TAN - May be present in the debris stream.	TAN – Mixed with enriched uranium oxide in fuel elements in the fuel cartridges and inserts for the HTRE reactors; also used as cladding.	TAN-P080
Nickel-61	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Nickel-63	RFO	Trace	Present in the debris stream. Present in the 74A/743 sludge from machining.	In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-P063
Nickel carbonyl	RFO	N/A	NA	Uncontained gas used in nickel plating in B771, B776/777, and B779.	RF-C224, RF-P076, RF-P106, RF-P158, RF-P264, RF-P408, RF-U041, RF-U042, RF-U046, RF-U151

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Nickel chloride (nickelous chloride)	RFO	trace	May be present in the debris stream. B444 and B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in parts plating and by the Technical Staff to electroplate and electroless-plate thorium. In B559: used in Laboratory operations.	RF-P075, RF-P084, RF-P085, RF-P408
Nickel metal	RFO	trace	Present in the debris stream. B444, B776/777, B779 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B444: used in parts casting, alloying, plating, electroplating, in Special Order work, and in R&D Operations. In B771, B776/777, and B779: nickel carbonyl (until the late 1960s) and other nickel products used for nickel plating. In B771: used as rods and filters in the fluidized bed fluorinator. In B779: used in electroplating for worn utility and process equipment. In B881: used in Special Order work and in R&D Operations.	RF-P084, RF-P085, RF-P095, RF-P105, RF-P106, RF-P178, RF-P264, RF-P332, RF-P348, RF-P404, RF-P419, RF-P423, RF-U042, RF-U046, RF-U141
	PER	trace	PER – May be present in the debris stream.	PER – used in the reactor at SPERT III.	PER-P008
Nickel nitrate (nickelous nitrate)	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations.	RF-P085, RF-P408
Nickel oxide	RFO	trace	May be present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B559: used in Laboratory operations.	RF-P085
Nickel powder	RFO	trace	May be present in the debris stream. B123 and B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used to complex DTPA during analyses to determine the rate of excretion (plutonium). In B559: used in the Laboratory. In B705: used in the Ceramics Laboratory.	RF-P095, RF-P178, RF-P408
Nickel sulfamate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in Metallurgical Operations in plating and in electroplating thorium.	RF-P075, RF-U422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Nickel sulfate	RFO	trace	May be present in the debris stream. B444, B776/777, and B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Chemistry Technology. Component of Enthone Enplate nickel plating solution used in B444 to coat beryllium shapes. Component of Nickel Tungsten Plating Solution and Nickel Tungsten Solution used for plating in B771, B776/777, and B779.	RF-P084, RF-P085, RF-P251, RF-P408
Niobium boride	RFO	trace	May be present in the debris stream.	In B705: hot-pressed into containers/crucibles.	RF-P173
Niobium carbide	RFO	trace	May be present in the debris stream.	In B705: hot-pressed into containers/crucibles.	RF-P173
Niobium metal	RFO	trace	May be present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444 and B447: used in Physical Metallurgy and alloyed with depleted uranium and zirconium.	RF-P166, RF-U115, RF-U230, RF-U244, RF-U245
	CPP	trace	CPP – May be present in the debris stream.	CPP – Activity cleaned from equipment during decontamination in the cells in CPP-601.	INTEC-U002
Niobium oxide	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: used in the Coatings facility.	RF-P184
Nitrate Salts	RFO	trace	May be present in the CWS filter stream. May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: collected on the filter media of CWS/HEPA glovebox and plenum filters. In B881: added to the solvent extraction system to increase the specific gravity of the solution.	RF-P026
Nitric acid (0.01N nitric acid; 0.35N nitric acid; 0.5N nitric acid; 3M nitric acid; 6N nitric acid; 6.2M nitric acid; 4M nitric acid; 7N nitric acid; 8M nitric acid; 9N nitric acid; 10M nitric acid; 10N nitric acid; 12N nitric acid; 12M nitric acid; 12.5N nitric acid; 12.7M nitric acid; 13M nitric acid; 15.9M nitric acid; 16M nitric acid)	RFO-DOW-6H, filters RFO	major	May be present in the debris stream. B771 liquid wastes to B774 where they were neutralized and processed to 741 sludge. B123, B444, B559, B776, B779, B865, B881, and B883 liquid waste to B774 where they were neutralized and processed to 742 sludge or were sent to the solar evaporation ponds. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in Laboratory analysis, including analyses performed on autopsied and bioassay material (B123). In B331: used to pickle thorium. In B444 and B447: used in Manufacturing Technology. In B444 and B883: used as an etchant. In B444: used in depleted uranium chip processing, in leaching (sludge, graphite, and ash), in pickling beryllium-copper alloy parts prior to electroplating, and to pickle thorium. In B771: used in Neptunium preparation, in dissolution, in anion exchange, in leaching operations, in recovery of Plutonium and Americium from chloride salts, in the calciner scrubber, and in R&D operations. In B776: used in R&D operations. In B779: used in Chemistry Technology, in Plutonium Physical Metallurgy, in plutonium hydriding, and in the Coatings facility. In B865: used in beryllium etching R&D.	RF-C211, RF-C224, RF-C227, RF-P026, RF-P027, RF-P028, RF-P040, RF-P058, RF-P063, RF-P064, RF-P068, RF-P073, RF-P075, RF-P084, RF-P085, RF-P091, RF-P099, RF-P104, RF-P105, RF-P106, RF-P108, RF-P122, RF-P142, RF-P160, RF-P162, RF-P176, RF-P178, RF-P181, RF-P191, RF-P192, RF-P199, RF-P202, RF-P216, RF-P244, RF-P246, RF-P250, RF-P251, RF-P260, RF-P332, RF-P333, RF-P346, RF-P347,

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B881: used in Enriched Uranium Recovery Operations, in OY leach operations (until 1973), to clean out coolant lines during inventory, and to pickle thorium. In B883: used in cleaning and degreasing. Used in electropolishing throughout RFP. Component of Ox-Out, used in B883 for cleaning. Component of Tuckers Etch used in beryllium-aluminum metallurgy. Component of Derustit SS-3 used in B865 and B883 in developmental studies involving beryllium and depleted uranium.	RF-P349, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U040, RF-U113, RF-U137, RF-U141, RF-U143, RF-U189
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-P001, ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-P008, ARA-U003, INTEC-P005, INTEC-P006, INTEC-U002, NRF-C031, PER-P006, PER-P012, PER-P013
	ARA	trace	ARA – May be present in the debris stream.	ARA – ML-1 development. At ARA626, used in the Hot Cell and Laboratory.	
	CFA-646-2H:	trace	CFA – May be present in the debris stream.	CFA – Used in the recovery of uranium from simulated fuel elements processed in CFA-674.	
	CPP-601-4H:	trace	CPP – May be present in the debris stream.	CPP – Used in dissolution of stainless steel-clad fuel from the Submarine Intermediate Reactor (1959-1965). Used in Neptunium Recovery operations performed in CPP-601. Used in combination with other chemicals and products for decontamination inside the cells in CPP-601 and the calciner at the Waste Calcining Facility. Fed to the calciner at the Waste Calcining Facility to clean the lines. Used by Chemical Engineering in the High Bay Facility. CPP-640, used to dissolve graphite fuel element ash (ROVER) and stainless steel assemblies.	
	NRF	trace	NRF – acids were neutralized prior to being processed into Crud.	NRF – used at ECF: in Decontamination room; in Hot Cells; in Radiochemistry Laboratory; as part of Demineralizer wash and flush.	
	PER	trace	PER – May be present in the debris stream.	PER – used in reactor surface cleaning. Deuterated nitric acid used in heavy water system.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – used in metallographic preparation.	
	TRA	trace	TRA – May be in the debris stream.	TRA – Used for metal etching in TRA-632.	
Nitric acid-Nitradd solution	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been containerized and sent to B774 for processing into 742- or 744 sludge.	In B881: used in stainless steel operations.	RF-C224, RF-C227, RF-P084, RF-P408, RF-P423

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Nitradd activator (fluoride salts in acetic acid)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been containerized and sent to B774 for processing into 742- or 744 sludge.	In B881: used in stainless steel operations.	RF-P423
Nitrobenzene	RFO-DOW-15H, organic sludge RFO	trace	May be present in debris stream. B771 liquid waste to B774, 741 sludge. B123, B559, B881 liquid waste to B774, 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B559, B771, and B881: used in Laboratory analysis.	RF-P222, RF-P408, ID-P091, ID-P109, ID-U297
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Nitrocellulose (cellulose nitrate)	RFO-DOW-4H, paper, rags, plastic. Clothing, cardboard, wood, and polyethylene bottles	trace	May be present in debris stream. B771 liquid waste to B774, 741 sludge. B444, B779, and B881 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444, B771, B779: used in R&D operations. Component of Dykem Steel Blue Dye Penetrant used by NDT in parts inspection in B444. Component of Dychem Dye Penetrant used in parts inspection by NDT in B444. Component of Spot 'N Glaze Putty used in B881.	RF-C224, RF-C226, RF-P047, RF-P084, RF-P138, RF-P408, ID-P091, ID-U297
Nitroglycerin	TAN	trace	TAN – May have been consumed in the experiments.	TAN – Component of dynamite used as a poison propellant in tests for the HTRE reactors (also tested at the BORAX I reactor).	TAN-P079
Nitromethane	RFO	trace	May be present in the debris stream. Present in the 74A/743 sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Chlorothene VG used in Product R&D and in Chemistry R&D. Component of Dowclene EC used in B771 in Product R&D. Inventory chemical.	RF-C164, RF-P102, RF-P187, RF-P408
2-Nitropropane	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Nonylphenoxy polyethoxy ethanol	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. May be present in the 74A/743 sludge.	Component of Cimcool, used in B444 used as a coolant in D-38 machining.	RF-P084
Nonylphenoxy poly(ethyleneoxy) ethanol	RFO	trace	Present in the debris stream. Present in 744 sludge. Was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. May be present in the 741- and 742 sludges in very small amounts.	Component of Igepal used in “KW” detergent.	RF-P026, RF-P408, RF-U028, ID-U297
Octamethylcyclotetra-siloxane	RFO	trace	May be present in the debris stream.	Component of Silastic E-RTV Rubber Base used in B881 in NDT.	RF-C212, RF-C226, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Octanol (Octyl alcohol)	RFO	trace	Present in the debris stream. B991 liquid waste bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy. Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Octyl diphenyl phosphate	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge.	Component of Pydraul 312 used in B779 in coolant flammability studies.	RF-P332
Oils - not specific	RFO	trace	May be present in 74A/743 sludge. May be present in the debris stream. May have been bottled and sent to B774 for processing into 744 sludge and/or buried in 742 sludge.	In B779: used in plutonium heat treating baths for R&D.	RF-P408, RF-U203
Oil-Dri	RFO	trace	Present in the debris stream. Possibly present in 74A/743 sludge.	Used to absorb liquids at RFP.	RF-P047, RF-P408, RF-U070, RF-U100
Oils, absorbed	RFO	trace	Present in B774, 74A/743 sludge. May be present in the debris stream.	In B774: 74A/743 sludge contained large quantities of absorbed oil-coolant mixture.	RF-P097, RF-P108, RF-P260, RF-P408, RF-U067, RF-U100, ID-U297
Oils, PCB	RFO	trace	Present in 74A/743 sludge. Small amounts may be present in 741-, 742-, and 744 sludge. Present in the debris stream.	Inventory list. In B444 and B776: non-flammable hydraulic oil put into use after the 1957 fire in B771. In B883: used in at least 2 Clearing presses on the "A"-side; not removed from these until the early 1980s, another press did not have PCB oil removed until the 1990s.	RF-C224, RF-P063, RF-U057
Organic acids, not specific	RFO	trace	May be present in the debris stream. Present in 744 sludge. B123, B441, B559, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, B881: used in the Laboratories.	RF-P047
Oxalic acid	RFO	trace	Present in the debris stream. B771 liquid wastes to B774, 741 sludge. B123, B441, B779, B881 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste and B991 waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B771, and B881: used in the Laboratories. In B771: used in oxalate precipitation for americium recovery (1962 to 1980's), in precipitation for Neptunium and Cm-244 recovery, and in R&D operations. In B779, B881, and B991: used in Metallography operations for etching. In B779: used in Nuclear Joining, in the Coating facility, in auger spectroscopy, and in R&D operations. Component of Noxon metal polish used in B444 for cleaning beryllium parts.	RF-C224, RF-C227, RF-P026, RF-P040, RF-P058, RF-P084, RF-P091, RF-P104, RF-P181, RF-P260, RF-P332, RF-P333, RF-P346, RF-P347, RF-P348, RF-P408, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in combination with other chemicals and products for decontamination inside the cells in CPP-601 and the calciner at the Waste Calcining Facility.	ARA-P004, ARA-U003, INTEC-U002
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in metallographic preparation. Used for decontamination in the Decontamination Room and in the Hot Cell in TAN-607.	
Paint	RFO	trace	Present in the debris stream.	In B771: contaminated paint was stripped off the floor and either sent to the incinerator or disposed as combustible waste. Some equipment was painted with Hollingshead 333 “Cocoon” (50% acetone) prior to removal and disposal to fix the contamination.	RF-P408, RF-U128, RF-U139
Palladium metal	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B771: used to make shadowed replicas in plutonium Metallurgical R&D. In B779: used in the Coatings facility.	RF-P040, RF-P084, RF-P218, RF-P241, RF-U201, RF-U202, RF-U203, RF-U210, RF-U217
	INL	trace	INL - May be present in the debris stream.	INL - Source document does not specify use.	ARA-U003
Paraffin-base petroleum oil	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Led-Plate Anti-Seize Compound used in B779.	RF-P040, RF-P408
Paraffin-kerosene	RFO	trace	May be present in the debris stream. B777 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B777, used in the Plutonium Metallography Laboratory to thin diamond paste for polishing.	RF-P419
Paraffin wax, hydrotreated and/or clay-treated	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Technical grade Paraffin wax, used in B122 to construct hand phantoms for calibrating the lung counter.	RF-P040, RF-P178, RF-P408
Paraffin wax, Technical grade	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B122: used to construct hand phantoms for calibrating the lung counter. Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P178, RF-P408
Paraformaldehyde	ANL-W	unk	unknown	Use was not identified.	ARA-P008
Paraldehyde	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Parylene® (DPXN; Dichloro diparaxylene)	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: used in Product Integrity and Test Measurements.	RF-C215, RF-U181

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Perchloric acid	RFO	trace	May be present in the debris stream. B123, B441, and B779 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, and B771: used in the Laboratories as a reagent. In B771 and B779: used in R&D Operations.	RF-C411, RF-P106, RF-P181, RF-P408, RF-P419, RF-P420, RF-P422, RF-U208
	NRF	trace	NRF – Acids were neutralized prior to being processed into Crud.	NRF – At the ECF, used in the Radiochemistry Laboratory.	NRF-C031
Perchloroethylene (Tetrachloroethylene; PCE; Perclene®)	RFO-DOW-15H: Organic sludge	minor	Waste oil-coolant drummed and sent to 903 Pad for storage. Beginning in 1967, 903 Pad waste solutions sent to B774, 74A/743 sludge. Waste coolant generated after 1966 sent/pumped to B774, 74A/743 sludge. Present in the debris stream. B559 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B334, B441, B444, B771, B776/777, B779, B881, B883, B886, and B991: used as a cleaning and degreasing solvent. In B444 and B881: used to recondition coolant lines, in the chip cleaning centrifuges, and to clean floors. In B444, used to ultrasonically clean beryllium-copper alloy parts prior to electroplating. B444 and B881 had solvent stills which would reduce the amount of solvent to waste. In B559: used in Laboratory operations. In B771 and B779: used in plutonium chip degreasing studies. In B776: substituted for trichloroethylene for approximately 4 months in 1966; usage stopped due to gummy residue left in gloveboxes. Component of Dowclene EC and CSM-320 used in B771 Product R&D. Component of Snopake® used for an unknown purpose.	RF-C090, RF-C109, RF-C181, RF-C195, RF-C215, RF-C224, RF-C226, RF-C227, RF-C406, RF-C411, RF-C412, RF-P023, RF-P047, RF-P063, RF-P064, RF-P084, RF-P085, RF-P100, RF-P102, RF-P106, RF-P117, RF-P160, RF-P187, RF-P137, RF-P224, RF-P241, RF-P408, RF-P422, RF-P423, RF-U113, RF-U115, RF-U152, RF-U188, RF-U254
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	ARA-U003, INTEC-P007
	TAN	trace	TAN – May be present in the debris stream.	TAN – Found in under-slab sampling of the Decontamination Room Sump in TAN-607.	
Perfume	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408
Petrolatum	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779. Component of Stay-Clean Soldering Flux used in B779 R&D Operations.	RF-P040, RF-P348, RF-P408
Petroleum grease	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Led-Plate Anti-Seize Compound used in B779.	RF-P040, RF-P408
Petroleum sulfonate soluble oil base	RFO	trace	Present in the debris stream. Present in 74A/743 sludge.	Component of Texaco Soluble Oil D metal working oil used in B881.	RF-C215, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
<i>Phenanthrene</i>	ARA	N/A	N/A	<i>Found during environmental sampling at ARA. No indication that this was included in any of the waste sent to RWMC.</i>	ARA-P010
o-phenanthroline	RFO	trace	May be present in debris stream. B123, B441, B559, and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774, for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, B881: used in the Laboratories as a pH indicator to determine iron content.	RF-P222, RF-P408
Phenetole (ethoxybenzene)	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation pond. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Phenol (Carbolic acid; Hydroxybenzene)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or sent to solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. Component of Cee Bee solvent used in the production area in B444. Component of Bakelite used to mount metallographic samples in B444.	RF-C164, RF-P085, RF-P139, RF-P181, RF-P408, RF-U233
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratory.	INTEC-P007
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure and Phenoline 302 Part B used in coating studies in TAN607.	TAN-P092
bis-phenol A polypropylene oxide fumarate polyester resin	RFO	trace	May be present in the debris stream.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Phenol novolac	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Phenoline 302 Part A used in coating studies in TAN607.	TAN-P092
Phenylacetaldehyde	RFO	trace	B444 liquid waste to B774, 742 sludge or the solar evaporation ponds. Some waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Phenyl ether	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Phenylethylethanolamine	RFO	trace	Present in the debris stream.	Component of Eastman 910 Surface Activator, used by NDT in B444 and B883.	RF-C215, RF-P408
Phenylmethylsiloxane	RFO	trace	Present in the debris stream.	Component of Dykem penetrant used by NDT in B444.	RF-P047, ARA-U003, ID-P091, ID-U297

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
2-phenylphenol	RFO	trace	Present in 74A/743 sludge. Present in the debris stream. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. B881 machining coolant may have been burned on Site.	Component of Winterphene disinfectant used to kill bacteria in machining coolant in B881.	RF-C215
1-phenyl-3-pyrazolidinone	RFO	trace	Present in the debris stream. B444 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Industrex Developer Replenisher used by NDT in B444 and B883.	RF-C216, RF-P084, RF-U151
Phosphoric acid	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444, B779, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in Physical Metallurgy as an electrolyte in etching, used by Metallurgical Operations in plating, and in sample preparation in the Metallurgical Laboratory. In B771: used in Plutonium Metallurgical R&D. In B779: used in R&D operations, in Nuclear Joining, and in Coating operations. In B865: used in beryllium etching R&D. In B881: used in Enriched Uranium Recovery operations, and for parts cleaning, etching, and sample preparation in the Laboratory. In B883: used in beryllium etching. Component of Ospho Metal Treatment used in B444 in Metallurgical operations. Component of Lime-A-Way used in R&D studies in B779. Component of Ospho Rust Dissolver used in B444 Metallurgical Operations.	RF-C224, RF-C227, RF-P040, RF-P084, RF-P085, RF-P091, RF-P135, RF-P191, RF-P192, RF-P218, RF-P244, RF-P346, RF-P408, RF-P422, RF-U153, RF-U201, RF-U217, RF-U422
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-U003
	ARA	trace	ARA – May be present in the debris stream.	ARA – ML-1 reactor development.	
Phosphorus-32	RFO	Trace	Present in the debris stream. Present in the 74A/743 sludge from machining.	In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-P063
Phosphorus pentoxide (Phosphorus anhydride)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P408, RF-P422
Phthalic anhydride	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
2-Picoline	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Picric Acid	RWMC	unk	RWMC - Glass bottles with metal lids. Unknown if this is actually in the waste.	RWMC – An INL employee stated that he had disposed of radiological contaminated glass bottles of crystalline picric acid under liquid in the burial ground during his early days working at the site. He could remember neither places of disposal in the burial grounds, nor the times of the occurrence.	RF-P086, ID-P109
Pine oil	RFO	trace	Present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Oakite Penetrant used by NDT in B444/447.	RF-C224, RF-P408
Platinum metal	RFO	trace	Present in the debris stream. B123, B441, B559, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, B881: gauze (as an electrode) and crucibles used in the Laboratories. In B771: lined the Monel filter boat used for Peroxide Precipitation and hydrofluorination and coated various parts of the hydrofluorinator. A sintered-platinum fritter filter was also used. In B779: used in the Coatings facility and in equipment used in Peroxide Precipitation in Process Chemistry Technology.	RF-P040, RF-P084, RF-P408, RF-U040, RF-U206, RF-U243
Platinum-iridium alloy	RFO	trace	May be present in the debris stream.	In B771: used to line the reactor tubes of the hydrofluorinators.	RF-U040
Platinized titanium	RFO	trace	May be present in the debris stream.	In B444: used as anode material in gold electroplating.	RF-P160
Plutonium-238	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Plutonium-239	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B771: used in Special Projects and present in weapons grade plutonium.	RF-P058, RF-P181
Plutonium-240	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Plutonium-241	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Plutonium-242	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B771: fabricated into disks for LASL.	RF-P181, RF-P348
Plutonium-aluminum alloy	RFO	trace	May be present in the debris stream. May have been shipped off-site for recovery. If processed at RFP, shipped to B771 for recovery; B771 liquid waste to B774, 741 sludge.	In B779: used in MSE salt cleanup experiments.	RF-P348
Plutonium dioxide	RFO	trace	May be present in the debris stream. Sent to B771 for processing; B771 liquid waste to B774, 741 sludge.	In B779: used in R&D operations as an oxidant (replacing magnesium chloride) in MSE.	RF-P348
Plutonium-gallium alloy	RFO	trace	Present in the debris stream. Present in the graphite. Present in the CWS/HEPA filter stream. Present in 741-, 742-, 743-, 744-, and 745 sludge.	In B559: the laboratory tested plutonium-gallium feed ingots for purity. In B707 and B776/777: used in delta plutonium in plutonium fabrication operations. In B771, processed through Recovery Operations. In B774: processed through waste treatment operations. In B779, used in R&D operations and in the Pyrochemical Support Laboratory.	RF-C419, RF-P040, RF-P084, RF-P218, RF-P333, RF-P408, RF-U210, RF-U217
Plutonium hydride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771 and B779: hydriding was used to remove plutonium from various items in the form of plutonium hydride. In B779: used to convert high purity plutonium metal to high bulk density plutonium dioxide. Hydride was calcined or burned to the oxide when hydriding was completed.	RF-P040, RF-P091, RF-P106, RF-P408, RF-P419, RF-P422
Plutonium, low-NGS (97.7 wt% Pu-239, 2.2 wt% Pu-240)	RFO	trace	May be present in the debris stream.	In B771: used to fabricate items for LASL.	RF-P333
Plutonium nitride	RFO	trace	May be present in the debris stream. Alloys may not have been processed for recovery at RFP. If they were, B771 liquid waste to B774, 742 sludge.	In B779: "black salt" formed during the cleanup of MSE salts using magnesium-zinc alloy.	RF-P332

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Plutonium, not specific	RFO	minor	Present in the debris stream. Present in the CWS Filter stream. Present in graphite. Present in 741-, 742-, 74A/743-, 744-, and 745 sludges.	In B707 and B776: cast and machined. In B771: processed through recovery systems. In B774: liquid wastes were processed. In B777: weapons components were assembled and disassembled. In B779: used in R&D operations. In B886: used in criticality experiments. In B991: weapons components were assembled and disassembled.	RF-P058, RF-P059
Plutonium tetrafluoride	RFO	trace	May be present in the debris stream (strip-out).	In B771: produced in the hydrofluorinator and in the fluid-bed fluorinator and processed in thermite reduction and the volatile fluoride process (from plutonium hexafluoride).	RF-P058, RF-P333, RF-P346, RF-P347, RF-P348, RF-P349, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-P424, RF-U141
Polyamide resin	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter and Devran 4170 Converter used in coating studies in TAN607.	TAN-P092
Polyamine adduct	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Phenoline 302 Part B used in coating studies in TAN607.	TAN-P092
Polybutene	RFO	trace	May be present in the debris stream. May be present in 74A/743 sludge.	Component of BP Dielectric 200 fluid used in B444 in Electric Discharge Machining.	RF-P084
Polychlorinated biphenyls (PCBs; Chlorinated aromatic transformer fluid; Dielectric fluid; Aroclor®; Clophen®; Chlorextol®; Inerteen®; Phenoclor®; DPG®; Pyranol®; Therminol®)	RFO-DOW-15H, Organic sludge	trace	Present in 74A/743 sludge and possibly in 744 sludge. May be present in Roaster Oxide. Present in the debris streams: PCB-containing fluorescent light ballasts, circuit breakers, switch gear, synthetic rubbers, plastics, paints, varnishes, printing ink, paper adhesives, and asphalt. The use of paper containing PCBs at RFP was not discontinued until the 1970's.	Found in the waste during the excavation of Trench 1 at RFP; present in the lathe coolant-oil mixture covering depleted uranium chips. Used throughout RFP in various items including: transformer and hydraulic oils, hydraulic and transformer oils cleaned up after spills, PCB-containing fluorescent light ballasts, circuit breakers, switch gear, synthetic rubbers (gaskets, rubber parts, etc), plastics, paints, varnishes, printing ink, paper, paper adhesives, and asphalt. All contaminated PCB oils were stored at RFP with other organic wastes at 903 Pad until the organic waste solidification process in B774 was initiated in 1966. An unknown portion of the 743-Series sludges that were shipped to the INEEL between 1966 and 1970 contain an unknown amount of PCB contaminated material.	RF-C058, RF-C224, RF-C405, RF-P040, RF-P041, RF-P047, RF-P051, RF-P057, RF-P058, RF-P059, RF-P060, RF-P063, RF-P064, RF-P065, RF-P084, RF-P092, RF-P093, RF-P094, RF-P181, RF-P408, RF-U401, ID-P109
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used at the BORAX III, IV, and V reactors.	ARA-P009, ARA-U003, ID-U297, NRF-C031
	NRF	trace	NRF – May be present in the debris stream in dried applied paints.	NRF – May be present in waste from the ECF.	

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	TAN	trace	TAN – May be present in the debris stream.	TAN – Source document does not indicate use. Found in under-slab sampling in the Decontamination Room Sump in TAN-607.	
Polyethylene glycol dimethylacrylate	RFO	trace	Present in the debris stream.	Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P408
Polyethylene glycol ester	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408
Polyglycol	RFO	none	Should not be in the waste.	Component of Dow Tordon used as an herbicide.	RF-U151
Polyisocyanate adduct	RFO	trace	Present in the debris stream.	Component of Amercoat 450HS paint.	RF-P106
Polyoxyalkylene glycol	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of Johnson's TL-131 used in B444 Metallurgical Operations.	RF-C227, RF-P408
Polyoxyethylene (POE)	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B991 liquid waste was containerized and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving and in B779 for an unknown purpose.	RF-P040, RF-P084, RF-P408
Polyoxyethylene alkyl phenol adduct	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4215 used in B444 as a plating bath rinseate.	RF-P084, RF-P408
Polyoxyethylene monostearate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	Component of GE Antifoam 60 used in B771 in Peroxide Precipitation.	RF-P068
Polyoxyethylene phenol condensate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4324 used in B779 in R&D studies.	RF-P408, RF-P422
Polyvinyl pyrrolidone	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Component of TISAB used in B771 in the Laboratory.	RF-P091
Portland cement	RFO	major	Present in the debris stream as an absorbent. Present in 741- and 742 sludges. Present in 744 sludge, in combination with Magnesia cement.	Used as an absorbent throughout RFP. In B774, used in 741-, 742-, and 744 sludges.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Potassium bromide	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084, RF-P408
Potassium carbonate	RFO	trace	Present in the debris stream. B444, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Most B444, B865, and B883 (depleted uranium) waste salts were drummed and sent to INL.	In B881 and B883: used extensively in eutectic salt bath to heat Enriched Uranium prior to rolling; waste salts were sent to Carbonate Salt Dissolution for the recovery of enriched uranium. In B444, B865, and B883: used extensively in eutectic salt baths prior to rolling depleted uranium; most waste salts were drummed and shipped to INL. Component of Holden 660 Mixture used for heat-treatment of depleted uranium in B444 and B883.	RF-P063, RF-P072, RF-P084, RF-P260, RF-P408
Potassium chloride	RFO-DOW-17H:	trace	Most of the MSE and ER salts were processed to recover americium and/or plutonium in B771. B771 liquid waste to B774, 741 sludge. B444, B776/777, B779, B865, B881, and B883 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. Most B444, B865, and B883 (depleted uranium) salts were drummed and shipped to INL.	In B771, B776, and B779: component of the salt used in molten salt extraction and electrorefining R&D. In B771: used in R&D operations. In B779: used in electrocoating with uranium oxide. In B881 and B883: used in eutectic salt baths prior to rolling enriched uranium. In B444, B865, and B883: used extensively in eutectic salt baths prior to rolling depleted uranium; most waste salts were drummed and shipped to INL.	RF-C224, RF-C227, RF-P063, RF-P072, RF-P109, RF-P116, RF-P121, RF-P260, RF-P262, RF-P333, RF-P346, RF-P408, RF-P421, RF-P423, RF-P424, RF-U141, ID-P091
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003
Potassium chromate	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Physical Metallurgy.	RF-P085, RF-P408, ID-P091
	CPP	trace	CPP – May be present in the debris stream.	CPP – Component of Turco 4502 used to decontaminate in the cells in CPP-601 and in the calciner at the Waste Calcining Facility.	ARA-U003, INTEC-U002
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in the decontamination solution used in the Hot Cell in TAN-607.	

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Potassium cyanide	RFO	trace	May be present in the debris stream. Present in 742 sludge, both in the sludge and buried in the sludge. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in copper strike operations when electroplating beryllium-copper alloy. In B774: mention of the disposal of "KCN" in 742 sludge drums. Listed on a Warehouse inventory, no indication as to the building using the chemical. Source document mentions use in a heat-treating process in the B444 Precision Shop.	RF-C045, RF-C120, RF-C411, RF-P047, RF-P160, RF-P408, RF-U026, ID-P109
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Potassium dichromate	RFO-DOW-17H: Evaporator salts RFO	trace	Present in the debris stream. B444 and B779 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Physical Metallurgy. Component of Zyglo Aqueous Developer ZP-5, used in B444.	RF-C215, RF-P085, RF-P408, ID-P091
Potassium dihydrogen phosphate	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084, RF-P408
Potassium 2-ethylhexanoate	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Cat® ELC (Extended Life Coolant) Premix 50/50 and Cat® ELC (Extended Life Coolant) Premix 60/40 spilled in the SDA and cleaned up during excavation activities.	ID-C202
Potassium ferricyanide	RFO TAN	trace trace	May be present in the debris stream. TAN – May be present in the debris stream.	On an inventory list, no building or use identified. TAN – Component of Murakamis reagent.	RF-C408, RF-P408 ARA-P004, ANL-W-P009
Potassium fluoride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in unknown process.	RF-P091, RF-P408
Potassium hydroxide (6N KOH)	RFO	minor	Present in the debris stream. Present in 741-, 742-, and 744 sludge from addition in B774. B771 liquid wastes to B774, 741 sludge. B444, B779, and B881 liquid wastes to B774, 742 sludge or to solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the copper strike performed during electroplating operations with beryllium-copper alloy parts. In B771: used in the hydrofluorinator scrubbers, used in the seal liquid for the vacuum pumps, used in KOH Precipitation in the americium recovery process, used in R&D operations, and used in ion exchange. In B774: used to neutralize acids received (with sodium hydroxide). In B779: used in electrocoating with uranium oxide and in R&D operations.	RF-C211, RF-C216, RF-C224, RF-C227, RF-P026, RF-P058, RF-P063, RF-P084, RF-P091, RF-P160, RF-P260, RF-P333, RF-P349, RF-P408, RF-P421, RF-P424, RF-U040

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B881: used in the Laboratory and in the off-gas scrubber. In B883: used in the scrubbers for the acid baths. Component of Kodak Developer and Kodak Industrex Developer Replenisher used by NDT in B444 and B883.	
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Component of Turco 4502 used to decontaminate in the cells in CPP-601 and in the calciner at the Waste Calcining Facility.	
	NRF	trace	NRF – Processed into Crud which is present in the debris stream.	NRF – At the ECF used in the Radiochemistry Laboratory.	ARA-P004, ARA-U003, NRF-C031, INTEC-U002
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Murakamis reagent. Component of the decontamination solution used in the Hot Cell in TAN-607.	
Potassium iodate	RFO	trace	May be present in the debris stream. Most of the SS&C was processed in B771 to recover plutonium and neptunium. B771 liquid waste to B774, 741 sludge. B779 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in Plutonium and Neptunium Thermite Reduction as part of the pyrotechnic initiators. In B779: used in chemical initiator studies. In B881: used in the Laboratory.	RF-C211, RF-P084, RF-P091, RF-P262, RF-P348, RF-P408
Potassium iodide	ANL-W	trace	May be present in the debris stream.	ANL-W – used in the reduction of xenon trioxide.	RF-U208
Potassium nitrate (Saltpeter)	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084, RF-P408
<i>Potassium salt 4-amino-3,5,6-trichloropicolinic acid</i>	<i>RFO</i>	<i>none</i>	<i>Should not be in the waste.</i>	<i>Component of Dow Tordon used as an herbicide.</i>	<i>RF-U151</i>
Potassium p-toluene sulfonate	RFO	trace	Present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Oakite Aluminum Cleaner NST used in B444 and B447 to clean beryllium parts.	RF-C227, RF-P084, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Potassium permanganate	RFO	trace	Present in debris stream. B122 liquid waste sent to the solar evaporation ponds. B123, B441, B559, B779, B881, and B883 liquid waste to B774, 742 sludge or to solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B122: used for personnel decontamination. In B123, B441, B559, B771, and B881: used in the Laboratories as a reagent. In B779: included on an excess chemical list. Component of Kodak Developer System Cleaner and Neutralizer used by NDT in B444 and B883.	RF-C216, RF-P040, RF-P084, RF-P085, RF-P181, RF-P408
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ARA-U003
	CPP	trace	CPP – May be present in the debris stream.	CPP – Component of Turco 4502 used to decontaminate in the cells in CPP-601 and in the calciner at the Waste Calcining Facility.	INTEC-U002
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in the decontamination solution used in the Hot Cell in TAN-607.	
Potassium persulfate	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the analytical Laboratory.	RF-P084
	TAN	trace	TAN - May be present in the debris stream.	TAN - Used in metallographic preparation.	ARA-P001
Potassium sulfite	RFO	trace	Present in the debris stream. B444 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Industrex Developer Replenisher used by NDT in B444 and B883.	RF-C216, RF-P084
Potassium vanadate	RFO	trace	Present in the debris stream. B444, B447, and B991 liquid wastes to B774, 742 sludge or to the solar evaporation ponds.	Component of Nalco 2826 used in B444, B447, and B991 in the process cooling water systems.	RF-P084
Powdered iron	RFO	trace	Present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste was bottled and sent to B774 for burial in 742 sludge.	In B881: used in Enriched Uranium Recovery in incinerator ash dissolution.	RF-P191
Promethium-141 (Pm-141)	RFO	trace	May be present in the debris stream.	In B444: used in sealed sources.	RF-P057

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Propane-1, 2-diol carbonate (PDC)	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D chemistry studies.	RF-P420, RF-P421, RF-P422, RF-P423
n-Propoxypropanol	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 669 used in coating studies in TAN607.	TAN-P092
Propylamine (1-Aminopropane)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent.	RF-C164
Propylene carbonate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 742 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D Chemistry studies.	RF-P419
Propylene glycol methyl ether	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB Cure and Devran 669 used in coating studies in TAN607.	TAN-P092
Protactinium-231 oxide	TRA	trace	TRA - Present in the debris stream.	TRA - Glovebox from TRA661 Nuclear Chemistry contaminated with this substance was disposed to the SDA.	
Pyrene	ARA	trace	ARA - May be present in the debris stream.	ARA - Source document did not specify use.	ARA-P010
Pyridine	RFO	trace	Present in the debris stream. B444, B559, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. In B559 or B771: used in the Laboratory in the support of the nonaqueous dissolution of plutonium. In B771 and B779: used in R&D operations.	RF-C164, RF-C411, RF-P408, RF-P420, RF-U151
	CPP	trace	CPP - May be present in the debris stream.	CPP - Used in the Laboratories as a solvent.	INTEC-P007
Quartz	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Quartz silica	RFO	trace	Present in the debris stream. May be present in 74A/743 sludge.	Component of Oil-Dri used to absorb liquids.	RF-P047, RF-P084, RF-P408
Quaterphenyl	OMRE	trace	OMRE - May be present in the debris stream.	OMRE - Component of Santowax R used as a coolant in the OMRE reactor (1957 to 1963). 1960 fire at OMRE at the organic coolant makeup tanks. Coolant and high boilers from OMRE were loaded out of the reactor and drummed. Drums were stored on-site; later shipped to the NRTS burial ground.	ARA-U003, ID-P091
Radioactive Lanthanum (RaLa)	CPP	trace	CPP - May be present in the debris stream.	CPP - Processed in CPP-601.	INTEC-P005

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Resorcinol (meta-Dioxybenzene)	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Rheological additive	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 4170 Converter used in coating studies in TAN607.	TAN-P092
Rhodium metal	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B779: used in the Coatings facility.	RF-P040, RF-P408
Salicylic acid (o-Hydroxybenzoic acid)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084, RF-P408
Samarium metal	ARA	trace	ARA - May be present in the debris stream.	ARA - Used as a neutron poison in the ML-1 reactor.	ARA-P003
Selenium dioxide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Selenium metal	RFO	trace	May be present in the debris stream.	In B991: used in the sputtering chamber.	RF-P408, RF-U153
Shell Vitrea oil	RFO	major	Present in the debris stream. Present in 74A/743 sludge. In B776 and B707, waste oil/coolant was collected in a centralized system and filtered. Drummed oil sent to 903 Pad (from B776 only) and later to B774 for processing into 74A/743 sludge. In B444 and B881, waste/oil coolant went to the solvent recovery stills. Waste oil was burned or buried in the Mound (later sent to 903 Pad, then to B774 for processing into 74/743 sludge). B776 filters were sent to B771 for counting and then either to recovery or to waste. B881 filters were sent to the B881 incinerator for recovery of enriched uranium. B444 filters were sent to waste.	In B776: beginning in 1958 oil was added to the plutonium machining process to enable more rapid machining with less chance of spontaneous combustion. Originally followed by a wash of PCE, soon replaced with carbon tetrachloride due to the residue left behind and the degradation of glovebox gloves by the PCE. By around 1960 Shell Vitrea was replaced with Texaco Regal A oil due to cost. In B881: used in Enriched Uranium Machining followed by a PCE wash until around 1960 when Texaco Regal A began use. Centralized system with filtering and solvent recovery stills designed to recycle spent solvents and mixtures operated between 1958 and 1962. Oil was scrubbed using nitric acid to recover the enriched uranium.	RF-P064, RF-P084, RF-P133, RF-P260, RF-P408, RF-U040, RF-U057, RF-U100, RF-U254
Silica (crystalline)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Bon Ami used in B444 and B779 as a detergent to clean beryllium-copper alloy parts prior to electroplating and used in stress corrosion cracking tests on depleted uranium-niobium alloy. Component of Loctite Pipe Sealant used in B444.	RF-P040, RF-P084, RF-P160, RF-P408, RF-U242

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB used in coating studies in TAN607. Component of Devran 669 used in coating studies in TAN607. Component of Devran 332 used in coating studies in TAN607. Component of Phenoline 302 Part A used in coating studies in TAN607.	TAN-P092
Silica aerogel	RFO	trace	Present in 74A/743 sludge. Present in the debris stream.	In B774: component of Santocel Grade 54 which replaced Cab-O-Sil in the Grease Plant operations. Santocel was eventually replaced by Micro-Cel E.	RF-C045, RF-C415, RF-P408
Silica gel	CPP	trace	CPP – May be present in the debris stream.	CPP – In CPP-633 used in absorbers.	INTEC-P005
Silicon carbide	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W - Used as an insulating powder at the FCF at EBR-II.	ANL-W-P001
Silicon dioxide (silicon oxide)	RFO	trace	Present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	In B444: used in grit blasting. In B771: formed in the off-gas system for the dissolution process from trying to process incinerator ash and ash heels causing plugging in the system (this dissolution was halted in the late 1970s). In B779: used in the Coatings facility.	RF-P040, RF-P084, RF-P408
	PER TAN	trace	TAN, PER – May be present in the debris stream.	TAN, PER - Component of Rafrasil, a filler material used in the construction of reactor fuses tested in the Aircraft Nuclear Propulsion Program.	TAN-P079
silicon dioxide, Synthetic amorphous	RFO	trace	Present in some 74A/743 sludge. Present in the debris stream.	Component of Cab-O-Sil, used in B774 in testing and initial operation of the Grease Plant, replaced by Santocel (eventually replaced with Micro-Cel E).	RF-C045, RF-C098, RF-C235, RF-C415, RF-P408, RF-U044, RF-U100
Silicone oil	RFO	trace	Present in 74A/743 sludge. Present in the debris stream. B444, B707, B776, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444 and B779: used in diffusion pumps. In B444 and B865: used in elevated temperature testing of beryllium. In B707 and B776: used to heat plutonium during rolling. Silicone oils were stored at 903 pad and later processed in B774. Component of Dow Corning High Vacuum Grease used in B776. Component of Silastic 732 RTV Sealant used by NDT in B881. Component of DC-705 used in B777 diffusion pumps. Component of Dow 550 silicone oil used in the rolling mills in B776.	RF-C035, RF-C210, RF-C212, RF-C215, RF-C226, RF-C232, RF-P349, RF-P408, RF-U133, RF-U232, RF-U254

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Silver cyanide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Silver metal	RFO	trace	Present in the debris stream. B444, B559, B776/777, and B779 liquid waste processed in B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May be present in 74A/743 sludge from machining operations. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: cast into ingots, used in Special Order work, used in R&D Operations, used in Physical Metallurgy, WR parts were coated in Assembly Coating, used in NDT, and used in cyanide plating of thorium as a pre-coat prior to electroplating. In B559 and B771: used in the Laboratory as the reference electrode in support of nonaqueous plutonium dissolution. In B777: used in pit components in Assembly Operations, and in silver anodes in silver electroplating. In B771, B776/777, and B779: used in R&D Operations silver plating and coating. In B779: used in beryllium welding, in the Coating facility as a deposited film, and included on an excess chemical list. In B881: used in Special Order work and in R&D Operations.	RF-P040, RF-P075, RF-P084, RF-P091, RF-P093, RF-P105, RF-P160, RF-P184, RF-P216, RF-P240, RF-P404, RF-P408, RF-P420
	ANL-W	trace	ANL-W – may be present in the debris stream.	ANL-W - A component of fuel pin cladding and is a melt refining contaminant (EBR-II).	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-P009, ID-P091
	ARA	trace	ARA – may be present in the debris stream.	ARA – used in ML-1 reactor development. ARA606 generated radioactive silver.	
	PER-601-1H:	trace	PER – may be present in the debris stream.	PER – Source documents do not specify use.	
Silver nitrate	RFO	trace	Present in the debris stream. B441, B444, and B881 liquid waste processed in B774, 742 sludge or sent to the solar evaporation ponds. B771 liquid waste processed in B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B441: used in NDT analysis and film processing. In B444 and B771: used in parts coating, plating, and Non-Destructive Testing. In B771: used in R&D operations. In B881: used in the Laboratory.	RF-P084, RF-P091, RF-P093, RF-P184, RF-P347, RF-P408, RF-P424
	TAN	trace	TAN - May be in the debris stream.	TAN – During the IET project, low concentration (.003 molar) sprayed into the effluent to aid in sampling and analysis.	TAN-P089

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Silver oxide	RFO	trace	Present in the debris stream. B441 and B444 liquid waste processed in B774, 742 sludge or sent to the solar evaporation ponds. B771 liquid waste processed in B774, 741 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B441: used in NDT analysis and film processing. In B444 and B771: used in parts coating, plating, and nondestructive testing. In B771: used in R&D operations.	RF-P091, RF-P093, RF-P184, RF-P347, RF-P408, RF-P424
Silver sulfate	RFO	trace	Present in the debris stream. B441 and B444 liquid waste processed in B774, 742 sludge or sent to the solar evaporation ponds. B771 liquid waste processed in B774, 741 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B441: used in NDT analysis and film processing. In B444 and B771: used in parts coating, plating, and nondestructive testing. In B771: used in R&D operations.	RF-P091, RF-P093, RF-P184, RF-P347, RF-P408, RF-P424
Soda lime (mixture of calcium oxide and sodium or potassium hydroxide)	RFO	trace	May be present in the debris stream. Liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B771: used in traps in the fluidized bed fluorinator. In B779: used in Chemistry Technology.	RF-P040, RF-P408, RF-P419
Sodium acetate (Sodium acetate trihydrate)	RFO	trace	Present in the debris stream. B123, B441, B444, B559, B779, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B123, B441, B559, B771, and B881: used in the Laboratory. In B771: used in americium purification and in R&D operations. In B779: used in R&D operations. In B444: used by the Technical Staff in the electroless-plating of thorium. Component of TISAB used in B771 in the Laboratory. Component of Kodak Fixer and Kodak Industrex Fixer and replenisher used by NDT in B444 and B883.	RF-C216, RF-C224, RF-P075, RF-P084, RF-P091, RF-P222, RF-P347, RF-P408, RF-P422, RF-P424
Sodium azide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Sodium bicarbonate (baking soda; soda)	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 742- or 744 sludge and/or burial in 742 sludge.	In B444: used to neutralize acids. In B881, used in the Laboratory. In B991: used to neutralize acids.	RF-C224, RF-C227, RF-P084, RF-P408, RF-U124
Sodium bichromate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Ospho Rust Dissolver used in B444 Metallurgical Operations.	RF-C227, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium bisulfate	RFO	trace	May be present in the debris stream.	In B779: used in an evaluation of commercial cleaners for use in waste treatment.	RF-P408, RF-P422
Sodium borohydride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771: used as a neutron poison in the fluidized bed fluorinator in lab-scale, pilot-scale, and production-scale operations	RF-P408, RF-P419
Sodium carbonate (Soda ash)	RFO	trace	Present in the debris stream. B123, B444, B447, B865, B779, B881, and B883 liquid wastes processed in B774, 742 sludge or to the solar evaporation ponds. Most B444, B865, and B883 waste eutectic salts were drummed and sent to INL. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B123: used in analyses of autopsied material. In B444: used to cathodically and anodically clean beryllium-copper alloy parts prior to electroplating. In B447: used in chemical milling of depleted uranium, beryllium, tungsten, brass, aluminum, and copper. In B881 and B883: a component of the eutectic baths used prior to rolling enriched uranium (component of Holden 660).; waste salts were processed through Carbonate Salt Dissolution for the recovery of enriched uranium. In B444, B865, and B883: a component of the eutectic baths used prior to rolling depeleted uranium (component of Holden 660 Mixture); most waste salts drummed and shipped to INL. In B881: used in the Laboratory and to backwash solvent during studies involving enriched uranium recovery from incinerator ash. Component of Oakite 12 and Oakite Penetrant used by NDT in B444 and B447 and for cleaning beryllium parts. Component of Kodak Developer used by NDT in B444 and B883. Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving and used in B779 for an unknown purpose.	RF-C215, RF-C224, RF-C227, RF-P040, RF-P063, RF-P072, RF-P084, RF-P091, RF-P160, RF-P176, RF-P191, RF-P192, RF-P408
	TAN	trace	TAN – May be present in the debris stream.	TAN – used in metallographic preparation.	ARA-P001
Sodium carbonate, anhydrous	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Sodium chlorate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	Component of Clorox used in B444 in the cooling water system.	RF-P084, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium chloride	RFO-DOW-17H: Evaporator salts RFO	trace	Present in the debris stream. B444, B447, B776, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the solution to determine the concentration of nickel in beryllium nickel-plating baths. In B447: used in chemical milling of depleted uranium, beryllium, tungsten, brass, aluminum, and copper. In B771/776/779: component of the salt used in Molten Salt Extraction and electrorefining R&D. In B881: used in the Laboratories. Component of TISAB used in B771 in the Laboratory.	RF-C227, RF-P084, RF-P109, RF-P116, RF-P121, RF-P251, RF-P260, RF-P333, RF-P346, RF-P408, RF-U141
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the demineralization of raw water in CPP-606.	INTEC-P005
Sodium chromate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4215 (and Turco 4215 Special, similar to Turco 4215) used in B444 as a plating bath rinseate.	RF-P084, RF-P408
Sodium citrate	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444 or B881: used in the electroless plating of thorium.	RF-P075, RF-P408
Sodium cyanide	RFO	trace	Present in the debris stream. Present in some 742 sludge drums as a buried container. B444 liquid waste to B774, 742 sludge or to solar evaporation ponds. The 742 sludge logbook notes several instances of “cyanide pellets” in the sludge drums. Was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in plating operations, to neutralize residual acid during preparation of beryllium-copper alloy parts for electroplating, and in Metallurgical Operations. On an inventory of chemicals, listed as 400 gallons “in use”, no building noted. Source document mentions use in B444 in a heat-treating process in the Precision Shop.	RF-C045, RF-C120, RF-C224, RF-C411, RF-P047, RF-P160, RF-P161, RF-P408, ID-P109
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Sodium cyclopentadienyl	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P346
Sodium dichromate	RFO-DOW-17H: Evaporator salts RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Chemistry Technology.	RF-C224, RF-P085, RF-P091, RF-P408, ID-P091
Sodium dodecylbenzene sulfonate	RFO	trace	Present in the debris stream. B444, B447, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Oakite 202 used in B444/447 to clean beryllium shapes. Component of Oakite 204 used in R&D studies in B779.	RF-P251, RF-P422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium ferrocyanide	RFO	trace	Present in the debris stream. B883 liquid waste to B774, 742 sludge or to solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B883: a component of Developer Rack Cleaner used in NDT operations.	RF-C215
Sodium fluoride	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Coating Laboratory. In B771: used in the fluidized bed fluorinator in lab-scale, pilot-scale, and production-scale operations. In B771 and B881: used in the Laboratories.	RF-C044, RF-C224, RF-P071, RF-P084, RF-P108, RF-P349, RF-P408, RF-P419, RF-U172, RF-U207
Sodium hydroxide, 30% or 50% aqueous solution (Caustic soda)	RFO	trace	Present in the debris stream. Present in 741-, 742-, and 744 sludge. B123, B444, B447, B776/777, B779, and B881 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some decontamination solutions and laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory. In B444: used in beryllium nickel plating and to cathodically and anodically clean beryllium-copper alloy parts prior to electroplating. In B447: used in Manufacturing Technology. In B771: used in plutonium-uranium solvent extraction, Peroxide Precipitation, and in R&D operations. In B774: used to neutralize acids (with potassium hydroxide). In B779: used in the Coatings facility, in R&D operations, and in Process Chemistry Technology in Peroxide Precipitation. In B881: used in analytical processes. Component of Oakite Super Rustripper used in B444 for cleaning beryllium parts, used in B779 for cleaning plutonium parts prior to plating and in plutonium metallurgical preparation. Component of Oakite 12 used in B444 for cleaning beryllium parts, used in B779 for cleaning plutonium parts prior to plating and in plutonium metallurgical preparation. Component of Formula 409 cleaner used in decontamination operations, particularly after the 1969 fire in B776/777. Formula 409 was also evaluated in R&D studies in B779 for use in waste treatment operations and in plutonium decontamination studies. Component of Enthone Alumon and Enthone Enplate used in B444 in beryllium shape coating. Component of Kerful used in R&D studies in B779.	RF-C224, RF-C227, RF-C408, RF-C411, RF-P040, RF-P047, RF-P058, RF-P068, RF-P073, RF-P084, RF-P085, RF-P091, RF-P104, RF-P106, RF-P108, RF-P160, RF-P181, RF-P224, RF-P251, RF-P260, RF-P346, RF-P347, RF-P408, RF-P419, RF-P420, RF-P422, RF-P423, RF-P424, RF-U115, RF-U167

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	ANL-W-P009, ARA-P001, ARA-P008, ARA-U003, INTEC-P005, PER-P006, TRA-C001, TRA-U010
	CFA-684-1H:	trace	CFA – May be present in the debris stream.	CFA – Source documents do not specify use.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used by Chemical Engineering in the Hazardous Chemical Waste Handling and Neutralization Facility (CPP-620 Annex)	
	NRF	trace	NRF – processed into Crud which is in the debris stream.	NRF – Used at the ECF: in the Hot Cells; in the Radiochemistry Laboratory.	
	PER	trace	PER – May be present in the debris stream.	PER – Used to regenerate ion exchange resin at SPERT I, II, III, and IV.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in metallographic preparation. Used in the Demineralization Plant in TAN-630, TAN-641, and TAN-646.	
	TRA	trace	TRA – May be present in the debris stream.	TRA – Used to make alkaline permanganate at TRA-642, used for decontaminating loops and piping. Used to regenerate ion exchange resin in TRA-666 and TRA-701.	
Sodium hydroxyethylene diamine triacetate (Sodium HEDTA)	RFO	trace	Present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Oakite Super Rustripper used in B444 for cleaning beryllium parts, used in B779 to clean plutonium parts prior to plating and in plutonium metallurgical preparation.	RF-P084, RF-P419
Sodium hypochloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: source documents do not identify use.	RF-P084, RF-P091
Sodium hypochlorite	RFO	trace	Present in the debris stream. B122 liquid waste collected in a portable tank which, when full, was taken to the solar evaporation ponds for emptying.	In B122: used to decontaminate individuals. Component of Clorox bleach.	RF-P084, RF-P178, RF-P408
Sodium hypophosphite	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used by the Technical Staff in electroless-plating of thorium. Component of Enthone Enplate nickel plating solution used in B444 for coating beryllium shapes.	RF-P075, RF-P251, RF-P408
Sodium lauryl sulfate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in plutonium recovery studies.	RF-P422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium metaborate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Developer used by NDT in B444 and B883. Component of Long Life 6100 used in B444 in Metallurgical operations.	RF-C227, RF-P408
Sodium metal	RFO	trace	Some laboratory waste sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Used and/or reacted with alcohol in the laboratory (either 771 or 881).	RF-P091, RF-P106, RF-P408
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used to cool the calciner in CFA-674.	ARA-U003, INTEC-P006
	TAN	trace	TAN – May be present in the debris stream.	TAN – Numerous small spills from storage area were reported.	
	INL	trace	INL - May be present in the debris stream.	INL - Used as a moderator and coolant in several reactors.	
	Rockwell ATI Division	trace	ATI - May be present in the debris stream in cemented form and in small amounts.	ATI - Used during reactor development.	ID-P091, ID-U297, ID-U298
Sodium metasilicate (sodium metasilicate pentahydrate)	RFO	trace	Present in the debris stream. B444, B447, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Wyandotte Stainless Steel Polish used in B881 stainless steel work. Component of Oakite Penetrant used in B444/447 in NDT. Component of Oakite 204 used in R&D studies in B779. Component of Kerful used in R&D studies in B779. Component of Triple C Spray Cleaner used in B991 for cleaning drums during shipping and receiving.	RF-C224, RF-C226, RF-P040, RF-P084, RF-P422, RF-P408
	PER	trace	PER – May be present in the debris stream.	PER - Component of Altrex detergent used at SPERT II for reactor cleaning.	PER-P012
Sodium methyl cellulose	RFO	trace	Present in the debris stream.	In B444: used in uranium casting as a graphite mold and crucible coating.	RF-P084
Sodium nitrate	RFO-DOW-17H: Evaporator salts	trace	Present in the debris stream. B444, B447, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste may have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B447: used in chemical milling of depleted uranium, beryllium, tungsten, brass, aluminum, and copper. In B881: used in Enriched Uranium Recovery involving incinerator ash dissolution. Component of Zyglon Aqueous Developer ZP-5 used in B444. Component of Turco 4215 used in B444 as a plating bath rinseate.	RF-P084, RF-P192, RF-P408
	RFO				
	CFA	trace	CFA – May be in the debris stream.	CFA – Used in the calciner while processing simulated fuel elements at CFA-674.	
	CPP-601-4H:	trace	CPP – May be present in the debris stream.	CPP – Source documents do not specify a use.	ARA-U003, ID-U297
Sodium nitride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771: source document did not specify usage.	RF-P091

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium nitrite	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in anion exchange to oxidize away the remaining ferrous sulfamate in the solution. Component of Nalco 2536 used as a rust inhibitor in B444 and B883. Component of Johnson's TL-131 used in Metallurgical Operations in B444.	RF-C224, RF-C227, RF-P084, RF-P262, RF-P264, RF-P408, RF-P423, ID-P091
Sodium oxide	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771 and B779: used in R&D operations.	RF-P346
Sodium perchlorate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or be burial in 742 sludge.	In B771: used in Neptunium voltammetric studies.	RF-P408, RF-P419
Sodium peroxide	RFO	trace	May be present in the debris stream. Would be in sand, slag, and crucible, sent to dissolution for recovery in B771. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B771: used in Plutonium and Neptunium thermite reduction as part of the pyrotechnic initiators. In B771: used by Manufacturing Technical in R&D. In B779: used in chemical initiator studies.	RF-C211, RF-P084, RF-P091, RF-P106, RF-P262, RF-P348, RF-P408, RF-U139
Sodium phosphate	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W – Source documents do not specify use.	ARA-P008, ID-P091
Sodium phosphate, tribasic	RFO-DOW-17H: Evaporator salts	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Sodium-potassium (NaK)	ANL-W TAN-633-4H:	trace	ANL-W and TAN - May be present in the debris stream.	ANL-W and TAN – Used for reactor cooling in the ANL-W reactors (EBR-I and EBR-II) and in the SNAPTRAN reactor.	RF-P054, ANL-W-P001, ANL-W-P009, ARA-P008, ID-P091
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used to heat the Waste Calciner (beginning in 2/1966 – removed in 1971). Note of several spills.	INTEC-P005, INTEC-U002
Sodium propionate	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or be burial in 742 sludge.	In B771: used in Neptunium voltammetric studies.	RF-P420
Sodium silicate	RFO	trace	Present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Triple C Detergent used for cleaning drums in B991 during shipping and receiving. Component of Oakite 202 used in B444/447 for cleaning beryllium shapes.	RF-P084, RF-P251, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium sulfate	RFO-DOW-17H: Evaporator salts	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	Component of Kodak Developer used in B444 in NDT operations. Component of Triple C Detergent used in B991 for cleaning drums during shipping and receiving.	RF-P084, RF-P408
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W – Source documents did not specify a use.	ARA-P009, ID-P091
Sodium sulfide	RFO	trace	Present in the debris stream. May be present in 741- and 742 sludge.	In B774: used in tests to determine an improved method of liquid waste treatment.	RF-P408, RF-U048
Sodium sulfite	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Present in 741- and 742 sludge from B774 testing. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B771: no use identified. In B774: used in tests to determine an improved method of liquid waste treatment. Component of Kodak Developer used by NDT in B444 and B883. Kodak Industrex Fixer and Replenisher and Developer used by NDT in B444 and B883.	RF-C215, RF-C216, RF-P084, RF-P091, RF-P408, RF-U048
	ANL-W	trace	May be present in the debris stream.	ANL-W – Source document did not specify a use.	ARA-P008
Sodium tetraborate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Nalco 2536 used as a rust inhibitor in B444 and B883. Component of Turco 4215 used in B444 as a plating bath rinseate solution.	RF-P084, RF-P094, RF-P408
Sodium tetraborate pentahydrate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Turco 4215 Special (similar to Turco 4215) used in B444 as a plating bath rinseate solution.	RF-P084, RF-P408
Sodium tetraboride	RFO	trace	Present in the debris stream. B444 and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Nalco 2536 used in B444 and B883.	RF-P084, RF-P094
Sodium thiocyanate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in the copper strike performed during the electroplating of beryllium-copper alloy.	RF-P160, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sodium thiosulfate (sodium hyposulfate; "Hypo")	RFO	trace	Present in the debris stream. B444, B881, and B883 liquid waste to B774, 742 sludge or solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B881: used in the Laboratory. Component of Developer Rack Cleaner used by NDT in B444 and B883. Component of Kodak Fixer used by NDT in B444 and B883.	RF-C215, RF-C408, RF-P084, RF-P408
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W – Used to titrate xenon trioxide.	RF-U208
Sodium tolytriazole	RFO	trace	Present in the debris stream. B444 and B447 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. Contaminated B991 liquid waste was containerized and sent to B774 for processing into 742- or 744 sludge.	Component of Nalco 2826 used in the B444, B447, and B991 process cooling water systems.	RF-P084
Sodium triphosphate	RFO	trace	May be present in the debris stream.	Inventory, no building specified.	RF-C224
Sodium tripolyphosphate	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Triple C Detergent used in B991 for cleaning drums during shipping and receiving. Component of Turco 4215 (and Turco 4215 Special similar to Turco 4215) used in B444 as a plating bath rinseate.	RF-P084, RF-P408
Solvent deasphalted residual petroleum oil	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	Component of Texaco Thuban 140 used in B779 in flammability studies.	RF-P332
Solvent-dewaxed heavy paraffinic petroleum distillates	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. May have been burned.	Component of Texaco Soluble D used in B881 in machining. Component of Transultex 210, used in B881 in machining.	RF-C215
	SDA	trace	SDA - Present in the debris stream.	SDA - Component of Release 1 VOC, spilled in the SDA and cleaned up during excavation.	ID-C202
Solvent-dewaxed residual oils (petroleum)	SDA	trace	Present in the debris stream.	Component of Release 1 VOC spilled in the SDA and cleaned up during excavation.	ID-C202
Sorbitan monostearate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	Component of GE Antifoam 60 used in B771 in Peroxide Precipitation.	RF-P068

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Stainless steel metal	RFO	major	Present in the debris stream. May be present in 74A/743 sludge from machining operations. B444, B447, B707, B776/777, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	<p>In B444 and B447: used in Parts Manufacturing and in Tool and Gauge Machining. Processed through electrochemical milling operations with tungsten, brass, copper, aluminum, beryllium, and depleted uranium.</p> <p>In B707: used in molds in forming plutonium ingots.</p> <p>In B771, used in filters for the peroxide precipitation process.</p> <p>In B776/777, stainless steel clad was used for ZPPR alloy plates.</p> <p>In B776, used in the cans used to store plutonium briquettes.</p> <p>In B777 made up pit components involved in Assembly.</p> <p>In B779, used as a substrate in the Coatings facility.</p> <p>In B881, beryllium ingots from B444 were encased in stainless steel and sent to B883 for rolling; also used in brazing operations.</p> <p>In B883, used in Manufacturing. After rolling, beryllium sheets were removed from the stainless steel.</p> <p>In B993, bonded to depleted uranium using dynamite.</p>	RF-P040, RF-P041, RF-P047, RF-P063, RF-P064, RF-P084, RF-P105, RF-P128, RF-P260, RF-P333, RF-P408, RF-U033, RF-U037, RF-U040, RF-U057, RF-U067, RF-U069, RF-U100, RF-U124, RF-U168, RF-U189, RF-U254
	CPP	trace	CPP – May be present in the debris stream.	<p>CPP – Used as cladding for some fuel elements. Processed in CPP-601 to recover the uranium. In CPP-640, fuel assemblies were dissolved in a titanium dissolver using nitric acid and aluminum nitrate. Solution sent to CPP-601 for processing.</p>	INTEC-P005, INTEC-P006
	TAN	trace	TAN – May be present in the debris stream.	<p>TAN – Used in cladding for the fuel in some inserts for the HTRE reactors.</p>	TAN-P080
Stainless steel-boron alloy	RFO	trace	Present in the debris stream.	<p>In B771: used in Raschig rings in the batch tanks for the chloride and thiocyanate systems.</p> <p>In B881: used in Raschig rings for the acid scrubber and for the caustic scrubber.</p> <p>In B886: in plates used for criticality experiments.</p>	RF-P232, RF-P260, RF-U040
Stannous chloride	RFO	trace	Present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	<p>In B123: used in respirator fit testing.</p> <p>In B771 and B779: used in R&D operations.</p>	RF-P104, RF-P122, RF-P349, RF-P408, RF-P413, RF-P422, RF-P423, RF-P424

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Stoddard Solvent (mineral spirits; Texsolv S® Varsol® 1)	RFO	trace	Present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B444: used in Tool and Gauge Machining. Component of Varsol® 1 solvent. Component of WD-40 used throughout RFP by maintenance. Component of Dow Corning 557 Silicone Dry Film Lubricant used in B444 Assembly Testing. Component of some paints, paint thinners, and liquid photocopier toners. Component of Aero-Gel used in R&D studies in B779.	RF-P084, RF-P408, RF-P422, ID-U297
	CFA INL	trace trace	CFA - May be present in the debris stream. INL - May be present in the debris stream.	CFA – Used in the Equipment and Repair building. INL - Used throughout INL.	ARA-U003
Steight run middle petroleum distillate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Strontium-90 (Sr-90)	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory. In B444: used in sealed sources. In B771: present in plutonium used in Special Projects (received from other Sites). In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-P057, RF-P058, RF-P063, RF-P181
<i>Strychnine alkaloid 99.9%</i>	<i>RFO</i>	<i>none</i>	<i>Should not be in any wastes.</i>	<i>Used mixed with corn to control the pigeon population.</i>	<i>RF-C242</i>
Styrene-divinylbenzene copolymer	RFO	trace	May be present in the debris stream. May have been buried in 742 sludge.	Component of Dowex ion exchange resins.	RF-P106, RF-P333, RF-P346, RF-P347, RF-P348, RF-P349, RF-P408, RF-P419, RF-P420, RF-P421, RF-P422, RF-P423, RF-U141
Styrofoam® (expanded cellular polystyrene)	RFO	trace	May be present in the debris stream. B777 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	In B777: scrap Styrofoam® was dissolved using trichloroethylene. No indication as to the original use of the Styrofoam®.	RF-P408, RF-U152

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Sulfamic acid	RFO	trace	Present in the debris stream. B444 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the dissolution process and in the Laboratories. In B881: used in the Laboratory. Component of Kodak Developer and Developer System Cleaner used by NDT in B444 and B883.	RF-C211, RF-C224, RF-C408, RF-P068, RF-P073, RF-P084, RF-P091, RF-P408, RF-U040
	NRF	trace	NRF – Acids were neutralized prior to processing into Crud which is in the debris stream.	NRF – At the ECF, used in the Decontamination Room. Component of Kodak Developer, used as a system cleaner.	NRF-C031
Sulfide standards	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B881: used in the Laboratory.	RF-P084
Sulfonated castor oil	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Sulfur containing C4-C8 olefin	RFO	trace	Present in the debris stream. Present in 74A/743 sludge. May have been burned.	Component of Transultex 210 used in B881 in machining.	RF-C215
Sulfur hexafluoride (sulfur fluoride)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory.	RF-P085, RF-P408
Sulfur powder	RFO	trace	Present in the debris stream.	In B441 and B551: used to clean-up mercury spills.	RF-P093, RF-P408, RF-U124
Sulfuric acid (6M sulfuric acid; 10N sulfuric acid)	RFO	trace	Present in the debris stream. B123, B441, B444, B559, B779, B865, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge. Originally, used radiography solution was disposed down the sanitary sewer. Later it was drummed and disposed in the solar evaporation ponds.	In B123, B441, B559, B771, and B881: used in the Laboratories. In B444: used in Physical Metallurgy, in plating processes, and to pickle beryllium-copper alloy parts prior to electroplating. In B881: used in Oralloy leach (until 1973). In B771: used in the Laboratory, in Part V leach, in Peroxide Precipitation, in R&D operations, and in neptunium dissolution. In B774: used in tests to determine an improved method of liquid waste treatment. In B779: used in Nuclear Joining, in the Coatings facility, in brazing, in metallurgy, in plutonium hydriding, in R&D operations, and in Process Chemical Technology in Peroxide Precipitation.	RF-C211, RF-C216, RF-C224, RF-C227, RF-C411, RF-P026, RF-P027, RF-P040, RF-P058, RF-P068, RF-P084, RF-P085, RF-P106, RF-P135, RF-P160, RF-P181, RF-P191, RF-P192, RF-P202, RF-P244, RF-P333, RF-P346, RF-P349, RF-P408, RF-P419, RF-P422, RF-U048, RF-U141, RF-U422

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
				In B865 and B883: used in beryllium etching R&D and in stainless steel decontamination studies. In B881: used in Enriched Uranium Recovery Operations. Component of Kodak Fixer and Kodak Industrex Fixer and Replenisher used by NDT in B444 and B883. Component of Kodak Developer System Cleaner and Neutralizer used by NDT in B444 and B883. Component of Derustit SS-3 used in B865 and B883 in developmental studies for beryllium and depleted uranium. Component of Prestolite Lead Acid Batteries.	
	ANL-W	trace	ANL-W – May be present in the debris stream.	ANL-W – Used in the operation of the BORAX III, IV, and V reactors.	
	ARA	trace	ARA – May be present in the debris stream.	ARA – used in the ML-1 reactor development. Used in metallurgical sample preparation.	ARA-P002, ARA-P003, ARA-P004, ARA-P006, ARA-P007, ARA-P008, ARA-U003
	CFA-640-1H:	trace	CFA – May be present in the debris stream.	CFA – machine shop waste, batteries.	
	CPP-601-4H:	trace	CPP - May be present in the debris stream.	CPP – Used in the dissolution of stainless steel-clad fuels from the Submarine Intermediate Reactor (1959-1965) and in a decontamination solution used in the cells in CPP-601. Used in the demineralization of raw water in CPP-606.	INTEC-P005, INTEC-P006, INTEC-U002
	NRF	trace	NRF – acids were neutralized prior to being processed into Crud which is present in the debris stream.	NRF – used at the ECF: in the Radiochemistry Laboratory.	NRF-C031
	PER	trace	PER – May be present in the debris stream.	PER – Used to regenerate ion exchange resin at SPERT I, II, III, and IV.	PER-P006
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in the Demineralizer Plant in TAN-630, TAN-641, and TAN-646.	
	TRA	trace	TRA - May be present in the debris stream.	TRA – Used to regenerate ion exchange resin in TRA-666 and TRA-701.	
Tall oil	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Tall oil bottoms	RFO	trace	Present in the debris stream. B444 and B447 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Oakite Penetrant used by NDT in B444/447.	RF-C224, RF-P408
Tantalum carbide	RFO	trace	Present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Tantalum metal	RFO	trace	Present in the debris stream. May be present in 74A/743 sludge from machining operations. B771 liquid waste to B774, 741 sludge. B444, B707, B776/777, B779, B881, and B883 liquid wastes to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in electroless coating, in Special Order work, and in R&D Operations. In B707 and B776/777: waste generated from molten salt extraction (crucibles, rods, funnels, stirrers, electrodes). In B771: processed through recovery operations. In B707 and B776: used in the foundry. In B779: used in plutonium hydriding, in R&D operations, and in the Pyrochemical Technology Support Laboratory (anodes, rods, shielding in extractor pumps, crucibles, funnels, stirrers). In B865: used in the manufacture of special order components. In B881: used in Special Order work, in R&D Operations, and in various parts of Enriched Uranium Recovery equipment including bayonet heaters. In B883: used in Manufacturing.	RF-C045, RF-P040, RF-P047, RF-P063, RF-P064, RF-P084, RF-P109, RF-P218, RF-P251, RF-P260, RF-P332, RF-P404, RF-P405, RF-P419, RF-P422, RF-P423, RF-U141
Tantalum oxide	RFO	trace	May be present in the debris steam. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: used in the Coatings facility.	RF-P184
Tantalum powder	RFO	trace	May be present in the debris stream. B779 liquid wastes to B774, 742 sludge, or to the solar evaporation ponds. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in Ceramics Manufacture. In B779: used in the Coatings facility.	RF-P404, RF-P408
Tartaric acid (Dihydroxysuccinic acid)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B776/777 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in R&D operations. Component of Nickel Tungsten Solution used for plating in B771, B776/777, and B779.	RF-P091, RF-P348, RF-P408
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in combination with caustic (not specific) and other agents in decontamination operations inside the cells in CPP-601 and in the calciner at the Waste Calcining Facility (beginning in 1966).	INTEC-U002
Tartrate	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B776/777 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Nickel Tungsten Solution used for plating in B771, B776/777, and B779.	RF-P348, RF-P408
Technicium-99	RFO	Trace	Present in the debris stream. May be present in 74A/743 sludge from machining.	In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-P063

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Teflon® (Tetrafluoroethylene polymer)	RFO	trace	Present in the debris stream.	In B444: sheets of Teflon used as drying mats in plating and rods and rigs used in electroless nickel plating. In B771: used in gaskets, glovebox lining, and piping on the chloride and thiocyanate lines; used in dissolver pots for the dissolution of magnesium-zinc alloy from waste-salt residue from plutonium dioxide reduction; used in dissolver pots for the dissolution of lead-plutonium oxide; solid Teflon used in the gaskets for the hydrogen peroxide system; used as an entrainment separator system in the evaporator; used as seals in the fluidized bed fluorinator. Component of Loctite Pipe Sealant used in B444.	RF-P084, RF-P161, RF-P251, RF-P408, RF-P419, RF-P422, RF-P423, RF-U040
Terphenyl	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W - Used in scintillation counting.	RF-P067, ARA-U003, ID-P091
	OMRE	trace	OMRE – May be present in the debris stream.	OMRE - Component of Santowax used as a coolant in the OMRE reactor (1957 to 1963). Coolant and high boilers from OMRE were loaded out of the reactor and drummed. Drums were stored on-site; later shipped to the NRTS burial ground.	
	TRA-603-23H				
tert-butyl alcohol (2-methyl-2-propanol; trimethyl methanol)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Tap Magic cutting fluid used in B444 Metallurgical Operations.	RF-C227
Tetrabromoethylene	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some waste may have been bottled and sent to B774 for processing into 74A/743- or 744 sludge and/or burial in 742 sludge.	In B444: used as float-sink separation process media in conjunction with Beryllium work.	RF-P084, RF-P085
Tetrabutyl ammonium hydroxide	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B559 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or be burial in 742 sludge.	In B559 and B771: used in non-aqueous plutonium dissolution studies.	RF-P420
Tetracalcium aluminoferrite	RFO INL	minor	Present in 741-, 742-, and 744 sludge. Present in the debris stream.	Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109
1,2,4,5-Tetrachlorobenzene	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
1,1,1,2-Tetrachloroethane	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Tetradecane (n-tetradecane)	RFO	trace	May be present in the debris stream. B991 liquid waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
Tetrahydrofuran (THF; Diethylene oxide; 1,4-Epoxybutane)	RFO	trace	Present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used in the Metallurgical Laboratory as a solvent. In B771 and B779: used in R&D operations.	RF-C164, RF-P346, RF-P408, RF-P422, RF-P423, RF-U151
Tetramethyl pararsanilin (Methyl violet)	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Dychem Steel Blue dye penetrant used in B444 in parts inspection.	RF-P084
Tetrasodium pyrophosphate	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Kerful used in R&D studies in B779.	RF-P422
Texaco Regal A oil (643 oil [RFP nomenclature]; Texaco Regal A R&O)	RFO	major	Present in 74A/743 sludge. Present in the debris stream. In B707 and B776, waste oil/coolant was collected in a centralized system and filtered. In B444 and B881, waste oil/coolant went to the solvent recovery stills. Waste oil was burned or buried in the Mound (later sent to 903 Pad). Beginning in 1966, waste coolant/oil was sent to B774 for processing into 74A/743 sludge. B707 and B776 filters were sent to B771 for counting. B881 filters were sent to the incinerator for recovery of EU. B444 filters were disposed.	In B776: replaced Shell Vitrea oil due to lower cost around 1960. Used for plutonium machining and was followed by a wash of carbon tetrachloride. In B881: used in enriched uranium machining with PCE. A solvent recovery still designed to recycle spent solvents, oils, and mixtures operated between 1958 and 1962. Heels were scrubbed with nitric acid to recover the EU. ~10% of the solvent was acceptable for reuse.	RF-C037, RF-P084, RF-P128, RF-P332, RF-P408
Thallic oxide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Thallium cyclopentadienyl	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D operations.	RF-P346
Thallium metal	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B991 liquid waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in R&D operations. In B779: present in a mixture of mercury and an unknown metal (8.2% thallium, 89.8% mercury, 2% unknown) and used for an unknown purpose.	RF-P040, RF-P408, RF-U124

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Thiourea	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Thorium-204 (Th-204)	RFO	trace	May be present in the debris stream.	In B444: used in sealed sources.	RF-P057
Thorium-232 (Th-232)	RFO	trace	May be present in the debris stream.	In B123, B441, B559, B771, and B881: Used in the Laboratories. In B125, B444, and B771: Used to calibrate and correct instruments.	
Thorium-234 (Th-234)	RFO	trace	May be present in the debris stream.	In B123, B441, B559, B771, and B881: Used in the Laboratories.	
Thorium carbide	CPP	trace	CPP - May be present in the debris stream.	CPP - Waste processed at INTEC and disposed at the SDA involved intermittent bulk disposals containing either unirradiated thorium or uranium actinides. Explicit shipments of thorium materials were identified as consisting of thorium carbide.	INTEC-P001
Thorium metal	RFO	trace	Present in the debris stream. B779 and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B779: used in Nuclear Joining. In B881: used to manufacture components in the late 1950s and early 1960s. Used to purify uranium-233 (thorium strike); waste sent to Oak Ridge for recovery. Used in experimental metallurgical operations. Thorium was vacuum-annealed and nickel-electroplated. Material mainly used in 1960, 1961, 1965-1969, and 1971.	RF-C441, RF-C442, RF-P040, RF-P064, RF-P075
Thorium nitrate	RFO	trace	May be present in the debris stream.	In B779: included in a list of excess chemicals. Source document did not specify use or building.	RF-P040, RF-U118
Thorium, nuclear grade	RFO	trace	May be present in the debris stream.	In B331: used in experiments pertaining to canning and coating thorium to reduce health physics concerns.	RF-P075
Thorium oxide	RFO	trace	May be present in the debris stream.	Source document did not specify use. May have been used as a mold coating. In B779: included on a list of excess chemicals.	RF-P040, RF-U118
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W - Used as a mold and crucible coating for metal refining at FCF.	ANL-W-P001, ANL-W-P002
Thulium metal	RFO	trace	May be present in the debris stream.	In B779: included in an excess chemical list.	RF-P040, RF-P408
Thulium powder/filings	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: included in an excess chemical list.	RF-P040, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Tin metal	RFO	trace	Present in the debris stream. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge.	In B331: used in experiments to coat thorium prior to rolling. In B771: Number 10 tin cans were used to store plutonium turnings created in the fabrication process. In B779: used in R&D operations and in the pyrochemical support laboratory.	RF-P040, RF-P075, RF-P408, RF-U057
Tin oxide	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge.	In B771: used by Manufacturing Technical in R&D operations.	RF-U139
Titanium boride	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles. This material was determined to form the best performing container for molten beryllium.	RF-P173
Titanium carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Titanium carbide-tungsten carbide-molybdenum carbide-aluminum oxide-cobalt	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles. This material was determined to form the best performer for molten nickel.	RF-P173
Titanium dioxide	RFO	trace	Present in the debris stream.	Component of Loctite Pipe Sealant used in B444. Component of Spot 'N Glaze Putty used in B881. Component of Snopake® used for an unknown purpose.	RF-C224, RF-C226, RF-C411, RF-P084, RF-P408
	TAN	trace	May be present in the debris stream.	TAN – Component of Amercoat 66 used in coating studies in TAN607. Component of Devran 669 used in coating studies in TAN607. Component of Devran 232 used in coating studies in TAN607. Component of Devran 4170 used in coating studies in TAN607.	TAN-P092
Titanium metal	RFO	trace	Present in the debris stream. B444, B447, and B779 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. May be present in 74A/743 sludge from machining operations.	In B444: used in parts casting, alloying, in parts production, in Special Order work, in R&D Operations, and in Assembly Coating. In B447: used in Physical Metallurgy. In B779: used in Nuclear Joining and in the Coating facility as a film. Used as a coating on boron nitride. In B881: used in Special Order work and in R&D Operations. In B883: used in Manufacturing.	RF-C227, RF-P040, RF-P047, RF-P063, RF-P084, RF-P085, RF-P184, RF-P240, RF-P404
	CPP	trace	CPP – May be present in the debris stream.	CPP – Dissolvers used in CPP-640 for stainless steel assembly dissolution.	INTEC-P005
	TAN	trace	TAN – May be present in the debris stream.	TAN – Mixed with uranium oxide in some of the fuel elements for the HTRE reactors.	TAN-P080

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Titanium nitride	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Titanium powder	RFO	trace	May be present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in Assembly Coating. In B779: used in the Coating facility and included on an excess chemical list.	RF-P040, RF-P408
Titanium silicide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Titanium sponge	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in vapor deposition, vacuum coating, and alloying with depleted uranium.	RF-P003
Toluene (Methylbenzene)	RFO	trace	Present in the debris stream. B123, B441, B444, and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B991 liquid waste and some laboratory waste was bottled and sent to B774 for processing into 744- sludge and/or burial in 742 sludge.	In B123 and B441: used in the Laboratories. In B444: used in plating and in the Metallurgical Laboratory as a solvent. In B771: used by HP radiation technicians to remove rubber cement from film frames and used in R&D chemistry studies. In B779: used in R&D chemistry studies. Common constituent in paint, stripper, and thinner. Component of Varsol® 1 and Varsol®. Varsol® used in B444 Metallurgical operations, B881 enriched uranium R&D operations, and in B779 in sample preparation for x-ray analysis, tensile testing, and plutonium metallurgy. Component of Cee Bee solvent used in B771 for parts cleaning. Component of Formula A Paint Remover used throughout RFP. Component of Amercoat 33 paint. Component of Lubri Bond A used in B991 in Shipping and Receiving. Component of MacStop 9554 used in B444 as a plating bath solution rinseate. Component of Glyptal Red Insulating Enamel used by NDT in B444, B776, and B881. Component of Spot 'N Glaze Putty used in B881.	RF-C164, RF-C213, RF-C218, RF-C224, RF-C226, RF-C406, RF-P040, RF-P057, RF-P084, RF-P085, RF-P106, RF-P181, RF-P408, RF-P419, RF-U182, ID-U297
	ARA	trace	ARA – May be present in the debris stream.	ARA – Source documents do not specify use.	ARA-P009, ARA-P010, ARA-U003

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the Health and Safety Laboratory in CFA-633 and in the RESL in CFA-690.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	INTEC-P007
	PER-ORM-1H:	trace	PER-ORM – May be present in the debris stream.	PER-ORM – Source documents do not specify use.	
	TAN	trace	TAN – May be present in the debris stream.	TAN –Component of Devran 4170 and Devran 4170 Converter, used in coating studies in TAN607. Used in the Chemical Laboratory in TAN-630.	TAN-P092
Toluene 2,4-diisocyanate (TDI)	RFO	trace	Present in the debris stream. May be buried in 744 sludge.	Component of Create-A-Mold 3D Molding Compound resin possibly used in B444 and/or B881.	RF-P047, RF-P084, RF-P408
o-Toluidine	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Tremolite	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies in TAN607.	TAN-P092
Tributyl phosphate (TBP)	RFO	trace	Present in the debris stream. B771 liquid waste to B774, 741 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been containerized and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used by Special Recovery in uranium solvent extraction. In B881: used in Enriched Uranium Recovery operations.	RF-P091, RF-P191, RF-P262, RF-P408, RF-P419
	CPP-601-5H: Organic solvents	trace	CPP – May be present in the debris stream.	CPP - Used in solvent extraction process for enriched uranium, in continuous dissolution for aluminum-clad fuels, and in 1 st cycle extraction in for zirconium-clad fuels.	ANL-W-P009, ID-P091, INTEC-P005, INTEC-P006, INTEC-U002
Tricalcium aluminate	RFO INL	minor	Present in 741-, 742-, and 744 sludge. Present in the debris stream.	Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109
Tricalcium silicate	RFO INL	minor	Present in 741-, 742-, and 744 sludge. Present in the debris stream.	Component of Portland cement used throughout RFP as an absorbent.	RF-C415, RF-P260, RF-P404, RF-P408, ID-P109

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
1,1,1-trichloroethane (Methyl chloroform; TCA)	RFO-DOW-3H:	minor	Present in 74A/743 sludge. Present in the debris stream. B123, B441, B444, B559, B776, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	Used for components cleaning throughout RFP.	RF-C214, RF-C224, RF-C227, RF-C406, RF-C408, RF-C412, RF-P023, RF-P040, RF-P047, RF-P059, RF-P064, RF-P084, RF-P085, RF-P100, RF-P102, RF-P106, RF-P187, RF-P241, RF-P408, RF-P423, RF-U100, RF-U115, RF-U422
	RFO-DOW-4H:			In B123, B441, B559, B771, and B881: used in Laboratory operations.	
	RFO-DOW-6H:			In B444: used in the Coating Laboratory.	
	RFO-DOW-9H:			In B771: used in R&D operations.	
	RFO-DOW-12H:			In B776: inadvertently used as a replacement for carbon tetrachloride in plutonium machining operations for a short time in 1967, use stopped due to flammability issues (full use started in 1972).	
RFO-DOW-15H:	In B779: used in Product Physical Chemistry and in Chemistry Technology.				
				Component of Zyglo ZP9 and Zyglo ZC7 used in B444 Non-Destructive Testing.	
				Component of Dowclene EC and CSM-320 used in B771 in Product R&D.	
				Component of Chlorothene Industrial, Chlorothene NU, VG, and Tri-Ethane used in B771 in Product R&D and in Chemistry R&D. Chlorothene NU used to rinse the drums on 903 Pad prior to disposal.	
				Component of Petrochem Microfinish and Tap Magic cutting fluid used in B444 Metallurgical operations.	
	CFA	trace	CFA – May be present in the debris stream.	CFA – used in the vapor degreaser in CFA-665, Equipment and Repair building.	ARA-P009, ARA-P010, ARA-U003, ID-P091
	CPP-603-4H:	trace	CPP - May be present in the debris stream.	CPP – Used in the Laboratories as a degreaser and solvent.	
	PER-601-1H:	trace	PER – May be present in the debris stream.	PER – Used at the SPERT I reactor building (PER-605).	
	PER-ORM-1H:				
<i>1,1,2-Trichloroethane</i>	ARA	N/A	N/A	<i>Detected during environmental sampling at ARA-II and ARA-III. There is no indication that it was included in the waste sent to the RWMC.</i>	<i>ARA-P010</i>

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Trichloroethylene (Ethylene trichloride; TCE; Triclene; Alk-Tri®; Ex-Tri®; Blacosolv®)	RFO-DOW-15H: Organic sludge	major	Present in the debris stream. Present in 74A/743 sludge. Waste TCE drummed and sent to 903 Pad for storage. Beginning in 1966, 903 Pad waste solutions sent to B774, for processing into 74A/743 sludge. Waste TCE generated after 1966 sent/pumped to B774, for processing into 74A/743 sludge. Some may have gone to B774, 741- and 742 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	<p>In B441: used as a solvent.</p> <p>In B444: used in Process Chemistry R&D for vapor degreasing prior to plating; used to degrease aluminum-silicon alloy wire used in beryllium brazing.</p> <p>In B447: used in Metallurgical Operations for vapor degreasing prior to annealing.</p> <p>In B705: used in Ceramics R&D and as an equipment cleaner. Used with plutonium throughout RFP since the early 1960s.</p> <p>In B771: used in Plutonium Fabrication R&D and other R&D operations, in thermal cycling, and to clean concrete.</p> <p>In B707 and B777: used in Assembly Operations and Special Assembly Operations for in-process and final vapor degreasing of WR parts and hardware; replaced by TCA in 1972.</p> <p>In B777: used in the cleaning of DJO parts.</p> <p>In B779: used in R&D operations.</p> <p>In B881: used in Metallurgical Operations, Assembly Operations, and Fabrication Operations for in-process cleaning and vapor degreasing WR parts; also used to degrease stainless steel.</p> <p>In B883: used in Metallurgical Operations and Chemistry Technology R&D.</p> <p>In B991: used in Final Assembly and in vapor degreasing. Component of Zyglo ZP9 and ZC7, Alk-Tri, Neu-Tri, and Ex-Tri.</p>	RF-C109, RF-C196, RF-C211, RF-C214, RF-C215, RF-C224, RF-C406, RF-C408, RF-C410, RF-C412, RF-C413, RF-P047, RF-P058, RF-P064, RF-P084, RF-P085, RF-P100, RF-P102, RF-P106, RF-P117, RF-P187, RF-P241, RF-P251, RF-P408, RF-P420, RF-P423, RF-P562, RF-U045, RF-U115, RF-U231, RF-U254
	ANL-W	trace	ANL-W – may be present in the debris stream.	ANL-W – used in fuel element cleaning.	ANL-W-P001, ARA-P009, ARA-U003, ID-P091
	CPP	trace	CPP – may be present in the debris stream.	CPP – Found in sampling at the solvent burner site. Used in the Laboratories as a solvent.	INTEC-P006, INTEC-P007
	NRF	trace	NRF – may be present in the debris stream.	NRF – used in the ECF: in the Decontamination Shop.	NRF-C031
	PER-601-1H: PER-ORM-1H:	trace	PER – may be present in the debris stream.	PER – used in fuel element cleaning. Used at the SPERT I reactor building (PER-601).	
	TAN	trace	TAN – may be present in the debris stream.	TAN – used in fuel element cleaning. Found in under-slab sampling of the Decontamination Room Sump in TAN-607.	

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
1,1,1-trichlorotrifluoroethane (Freon TMC®)	RFO	trace	Present in the debris stream. Present in the 74A/743 sludge. B444 liquid waste to B774, 742 sludge, or to the solar evaporation ponds. Some may have been bottled and treated in B774, 744 sludge and/or burial in 742 sludge.	In B444: used to degrease depleted uranium after quenching.	RF-U406
Trichloro-trifluoroethane – ethylene glycol monobutyl ether mixture (Freon TB-1®)	RFO-DOW-3H: Uncemented sludges RFO-DOW-4H: Combustibles RFO-DOW-6H: Filters RFO-DOW-9H: Metals RFO-DOW-12H: Particulate waste	trace	Present in the debris stream. Present in 74A/743 sludge. B779 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B779: in Nuclear Joining, Plutonium Physical Metallurgy, and in Product Physical Chemistry.	RF-P023, RF-P100, RF-P187
Trichlorofluoromethane (fluorotrichloromethane; Freon-MF®; Freon-11®)	RFO-DOW-3H: Uncemented sludges RFO-DOW-4H: Combustibles RFO-DOW-6H: Filters RFO-DOW-9H: Metals RFO-DOW-12H: Particulate waste	trace	Present in the debris stream. Present in 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B444, B559, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge, 74A/743 sludge and/or burial in 742 sludge.	In B559, B771, B881: used in the Laboratories as a solvent. In B779: used in Nuclear Joining, Plutonium Physical Metallurgy, and in Product Physical Chemistry. Component of Molykote 557 Lubricant (aerosol can) used in assembly testing in B444. Component of Dubl-Chek.	RF-C408, RF-P023, RF-P064, RF-P084, RF-P187, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
1,1,2-trichloro-1,2,2-trifluoroethane (Freon TF®; Freon-113®; Freon PCA®; Genesolv D®)	RFO-DOW-3H: Uncemented sludges RFO-DOW-4H: Combustibles RFO-DOW-6H: Filters RFO-DOW-9H: Metals RFO-DOW-12H: Particulate waste	minor	Present in the debris stream. Present in the 74A/743 sludge. B771 liquid waste to B774, 741 sludge. B444, B447, B559, B707, B776/777, B779, B881, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B444: used to degrease depleted uranium after quenching and used to ultrasonically clean beryllium-copper alloy parts prior to electroplating. In B444, B447, and B883: used for beryllium density measurements. In B559, B771, and B881: used in the Laboratories as a solvent. In B707: used to test tantalum crucibles for cracks and leaks. In B707 and B776/777: used in the density balance. In B776/777: used in Manufacturing Fabrication. In B779: used in Nuclear Joining, Plutonium Physical Metallurgy, and in Product Physical Chemistry. In B881: used in the production of parts for Inertial Fusion.	RF-C210, RF-C211, RF-C214, RF-C227, RF-C232, RF-C406, RF-C411, RF-P023, RF-P040, RF-P059, RF-P064, RF-P084, RF-P100, RF-P102, RF-P138, RF-P160, RF-P407, RF-P408, RF-P421, RF-P423, RF-U406, ARA-P010
Triethanolamine	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Long Life 6100 used in B444 in Metallurgical Operations. Component of Johnson's TL-131 used in B444 Metallurgical Operations. Component of Vantrol used in B444 Metallurgical operations. Mixture of this chemical, fatty acid soap, and sodium nitrite used in the cooling system in B444.	RF-C227, RF-P408
Triethylbenzene	TRA	trace	TRA - May be present in the debris stream.	TRA - Component of Dowtherm J used as a heat transfer fluid.	ARA-P013, ID-P088
Triethylenetriamine	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Devran 232 Converter used in coating studies used in coating studies in TAN607. Component of Devran 4170 Converter used in coating studies in TAN607.	TAN-P092
Trifluoroacetic anhydride	RFO	trace	May be present in the debris stream. B991 liquid waste was bottled and sent to B774 for processing into 742-, 74A/743- or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
2,2,2-Trifluoroethanol (Trifluoroethyl alcohol; TFE)	RFO	trace	May be present in the debris stream. B991 waste was bottled and sent to B774 for processing into 742-, 74A/743-, or 744 sludge and/or burial in 742 sludge.	In B991: used in Physical Metallurgy.	RF-P084
Triisooctomine (this may be Triisooctylamine)	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in the Laboratory.	RF-P181

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Triisooctylamine	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled and sent to B774 for burial in 742 sludge.	In B881: used in extraction in enriched uranium R&D operations.	RF-P191, RF-P408
Trimethylamine functionalized chloromethylated copolymer of styrene and divinyl benzene in the chloride form	RFO	trace	Present in the debris stream. May have been buried in 742 sludge and/or 744 sludge.	Component of Dowex 1x2 and Dowex 1x4 ion exchange resin used in B771 in plutonium and americium recovery and in B779 in R&D operations.	RF-P333, RF-P408, RF-P419, RF-P420, RF-P421, RF-P423, RF-U141
1,2,4 Trimethylbenzene	unknown	trace	May be present in the debris stream.	Component of Varsol® 1 solvent.	RF-P408, ID-U297
	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Amercoat 78HB used in coating studies in TAN607. Component of Amercoat 78HB Cure used in coating studies in TAN607.	TAN-P092
Trimethylolpropane trimer	TAN	trace	TAN - May be present in the debris stream.	TAN - High temperature turbine lubricant used in the PM-2A vessel. Empty drums containing residue of this chemical were disposed to the SDA from TAN607.	
2,2,4-Trimethylpentane (Isooctane)	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771: used in the Laboratory.	RF-P091, RF-P408
bis(tri-n-butyltin)oxide	RFO	trace	May be present in the debris stream.	Component of Mogul AG-471 used in B771 for an unknown purpose.	RF-P091
Tri-n-octyl phosphine oxide (TOPO)	RFO	trace	Present in the debris stream. B123, B441, B559, and B881 liquid wastes to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, and B881: used in the Laboratory as a reagent. In B123: used in bioassay analyses for personnel working with multiple alpha emitters. In B881: used in enriched uranium R&D operations.	RF-C044, RF-C224, RF-P106, RF-P108, RF-P191, RF-P408, RF-P413, RF-U172
Trisodium phosphate	NRF PER	trace	NRF and PER - May be present in the debris stream.	NRF and PER - Detergent used to clean reactor vessel surfaces.	ARA-P008, PER-P006, PER-P012

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Tritium	RFO	trace	Present in the debris stream. May be present in 74A/743 sludge from machining. Tritium-contaminated waste was processed into 744 sludge and may have been buried in 742 sludge. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Used in making tracers for R&D. Used for boosting yield in completed weapons. In B123: tritium distillation was performed. In B777: present in weapons in disassembly. In B883: supposedly present in very small quantities as an impurity in depleted uranium worked in the building.	RF-C169, RF-P059, RF-P063, RF-P181, RF-P408, RF-P413, RF-U026, RF-U171, RF-U178
Tungstate	RFO	trace	Present in the debris stream. B776/777 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge.	Component of Nickel Tungsten Plating Solution and Nickel Tungsten Solution used for plating in B771, B776/777, and B779.	RF-P348, RF-P408
Tungsten boride	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173, RF-P408
Tungsten carbide	RFO	trace	May be present in the debris stream.	In B705: used in grinding balls in ball milling to make refractory powder for compression into crucibles.	RF-P173, RF-P408
Tungsten carbide-cobalt	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in grinding balls in ball milling to make refractory powder for compression into crucibles and hot-pressed into containers/crucibles.	RF-P173
Tungsten disulfide	RFO	trace	May be present in the debris stream.	In B883: used as a lubricant during bare beryllium rolling.	RF-P244, RF-P408
Tungsten metal	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining operations. B444, B779, and B883 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B444: used in Manufacturing, in Special Order work, and in R&D Operations. Processed through electrochemical milling with stainless steel, brass, copper, aluminum, beryllium, and depleted uranium. In B776: used in equipment in molten salt extraction. In B779: used in welding in Nuclear Joining. In B881: used in Special Order work and in R&D Operations. In B883: used in Manufacturing.	RF-P040, RF-P063, RF-P084, RF-P085, RF-P332, RF-P404, RF-P408, RF-U141
	ARA	trace	ARA – may be present in the debris stream.	ARA – used in the ML-1 reactor.	ARA-P004
Tungsten powder	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: used in Ceramics Manufacture.	RF-P095, RF-P404
Uranium-233	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some of this waste was processed into 744 sludge and may have been buried in 742 sludge.	In B771 and B881: used in Special Order work.	RF-C109, RF-C443, RF-P064, RF-P084, RF-P348, RF-P421, RF-U026

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Uranium-234	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Uranium-236	RFO	trace	May be present in the debris stream. B123 liquid waste to B774, 742 sludge or to the solar evaporation ponds. Some laboratory waste was bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123: used in radioactive spiked solutions used in the Laboratory.	RF-P181
Uranium-236, highly enriched (89.1% U-236; 99.8% U-236)	RFO	trace	May be present in the debris stream. B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B881: used to fabricate metal buttons for ORNL.	RF-P333, RF-P419
Uranium trioxide	CPP	trace	CPP – May be present in the debris stream.	CPP – Uranium solutions in CPP-602 were converted to this material prior to packaging.	INTEC-P005
Uranyl nitrate	RFO	trace	Present in the debris stream.	In B881: an intermediate form of enriched uranium produced during Enriched Uranium Recovery. In B886: uranyl nitrate was used in criticality experiments; there were several spills in the facility.	RF-P060, RF-P084, RF-P085, RF-P117, RF-P224, RF-P232, RF-P233, RF-P245, RF-P249, RF-P408, RF-U247
Uranium tricyclopentadienyl chloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. May have been bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B771 and B779: used in R&D chemistry studies.	RF-P419
VM&P Naphtha	RFO	trace	May be present in the debris stream.	Component of Glyptal Alkyd and Glyptal Red Insulating Enamel used by NDT in B444, B776, and B881. Component of Spot 'N Glaze Putty used in B881.	RF-C212, RF-C226, RF-P408
	TAN	trace	May be present in the debris stream.	Component of Phenoline 302 Part B used in coating studies in TAN607.	TAN-P092
Vacuum pump oil, not specific	RFO	trace	Present in 74A/743 sludge. May be present in the debris stream.	Used in vacuum pumps throughout RFP.	RF-U254
Vanadium carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Vanadium metal	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining operations. B444, B447, B707, B776/777, B881, and B883 liquid waste to B774, 742 sludge, or to the solar evaporation ponds.	In B444 and B447: used in Physical Metallurgy, in electron beam welding with beryllium and depleted uranium, and in parts manufacture. In B707 and B776/777: parts received from B444 were cleaned and assembled. In B881: used in brazing operations. In B883: used in Manufacturing.	RF-P040, RF-P063, RF-P064, RF-P084, RF-P085, RF-P105, RF-P240
Vanadium oxide	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories.	INTEC-P007
Vanadium powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: used in the Coatings facility and included on an excess chemical list.	RF-P040, RF-P408
VascoMax® C (Cobalt-strengthened, 18% nickel maraging steel)	RFO	trace	May be present in the debris stream.	In B779: used as a substrate in the Coatings facility.	RF-P040
VascoMax® T (Titanium-strengthened, 18% nickel maraging steel)					
Vegetable oil soaps	RFO	trace	Present in 74A/743 sludge. May be present in the debris stream. May have been burned on Site.	Component of Winterphene disinfectant used to kill bacteria in machining coolant in B881.	RF-C215, RF-P408
Vermiculite	RFO	trace	Present in the debris stream. May be present in the roaster oxide stream.	Used as an absorbent throughout RFP.	RF-P408
	ANL-W	trace	Present in the debris stream.	At ANL-W, used to absorb liquid wastes in 30-gallon drums. There is no indication as to the volume used or the number of drums.	ANL-W-P001
Vinylidene fluoride-hexafluoropropene polymer	RFO	trace	Present in the debris stream.	Component of Fluorel® used in glovebox gaskets.	RF-P420
Vinyl plastic paint	RFO	trace	Present in the debris stream.	In B771: used to paint the mild steel supports and frame work for gloveboxes (equivalent to Amercoat 33).	RF-U040
Warfarin .025%	RFO	none	Should not be in the waste.	Used in bait boxes to control the rat and mice population.	RF-C242
Wetting agent, not specific	RFO	trace	Present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Ospho Rust Dissolver used in B444 Metallurgical Operations.	RF-C227, RF-P408

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Xenon trioxide	RFO-DOW-3H: Uncemented Sludge	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. May have been bottled for processing in B774, 744 sludge and/or burial in 742 sludge.	In B779: used in Chemistry Technology in a study of the reaction of plutonium with xenon trioxide in a perchlorate medium in 1966.	RF-U208
Xylenes (ortho-xylene, meta-xylene, and para-xylene)	RFO-DOW-3H:	trace	Present in the debris stream. B123, B441, B444, B559, B776, B779, and B881 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. Some laboratory wastes were bottled and sent to B774 for processing into 744 sludge and/or burial in 742 sludge.	In B123, B441, B559, B771, B881: used in the Laboratories. In B444: used in the Metallurgical Laboratory as a solvent. In B771 and B881: used to react contaminated lithium chips through 1968. In B881: used as a solvent. Common constituent in paint, thinner, and stripper. Component of Varsol® and Varsol® 1. Varsol® used in B444 Metallurgical operations, B881 enriched uranium R&D operations, and in B779 in sample preparation for x-ray analysis, tensile testing, and plutonium metallurgy. Component of Lubri Bond A used in B991 in Shipping and Receiving. Component of Glyptal Alkyd, Glyptal Clear Insulating Varnish, and Glyptal Red Insulating Enamel used by NDT in B444, B776, and B881. Component of Silastic E-RTV Rubber Base used by NDT in B881. Component of Spot 'N Glaze Putty used in B881.	RF-C164, RF-C212, RF-C215, RF-C218, RF-C224, RF-C226, RF-C406, RF-C411, RF-P040, RF-P064, RF-P084, RF-P086, RF-P114, RF-P181, RF-P408, ID-U297
	ARA	trace	ARA – May be present in the debris stream.	ARA - Component of Lubri-Bond A	ARA-P008, ARA-P009, ARA-P010, ARA-U003, ID-P091, ID-U297
	CFA	trace	CFA – May be present in the debris stream.	CFA – Used in the Health and Safety Laboratory in CFA-633 and in RESL in CFA-690.	
	CPP	trace	CPP – May be present in the debris stream.	CPP – Used in the Laboratories as a solvent.	INTEC-P007
	PER-ORM-1H:	trace	PER – May be present in the debris stream.	PER – Source documents did not specify use.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Component of Amercoat 66 used in coating studies in TAN607. Component of Devran 232, Devran 232 Converter, Devran 4170, and Devran 4170 Converter used in coating studies in TAN607. Component of Plasite 7155 used in coating studies in TAN607. Component of Phenoline 302 Part A and Part B used in coating studies in TAN607.	TAN-P092

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Xylol	TAN	trace	TAN - May be present in the debris stream.	TAN - Component of Chemfast 547 used in coating studies in TAN607.	TAN-P092
Yellow pigment	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Yellow 77 Wire Pulling Lubricant used in B779.	RF-P040, RF-P408
Yttrium metal	RFO	trace	May be present in the debris stream.	In B779: included on an excess chemical list.	RF-P040
Yttrium oxide	RFO	trace	Present in the debris stream. B444 and B705 liquid waste was bottled and sent to B774 for processing into 742 sludge. B771 liquid waste to B774, 741 sludge.	In B444: used to coat beryllium and uranium graphite molds prior to use. In B771: used to coat plutonium graphite molds prior to use. In B705: hot-pressed into containers/crucibles.	RF-P040, RF-P084, RF-P091, RF-P095, RF-P173, RF-P349, RF-P408
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used in fuel elements for the HTRE reactors ceramic fuel inserts.	TAN-P080
Yttrium powder	RFO	trace	May be present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	In B779: used in the Coatings facility.	RF-P040, RF-P084, RF-P408
Zeolite	PER	trace	PER - May be present in the debris stream.	PER - Used as a softener in the water treatment system at SPERT III.	PER-P006
Zinc metal	RFO	trace	Present in the debris stream. B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge.	In B331: used in coating experiments with thorium. In B444: used in cyanide plating of thorium as a pre-coat prior to electroplating. In B779: used in R&D operations and in the pyrochemical support laboratory.	RF-P040, RF-P075, RF-P408
Zinc chloride	RFO	trace	May be present in the debris stream. B771 liquid waste to B774, 741 sludge. B779 liquid waste to B774, 742 sludge. B331 liquid waste was bottled and sent to B774 for processing into 742- or 744 sludge or burial in 742 sludge.	In B771 and B779: used in R&D operations. In B331: used as a flux in tin baths for coating experiments with thorium. Component of Stay-Clean soldering flux used in B779 in studies for the decontamination of machining tool bits.	RF-P075, RF-P346, RF-P348, RF-P408, RF-P424
Zinc oxide	RFO	trace	May be present in the debris stream. B444 liquid waste to B774, 742 sludge or to the solar evaporation ponds.	Component of Enthone Alumon used in B444 in beryllium shape coating.	RF-P251, RF-P408
Zircaloy®	ANL-W NRF-618-5H: PER CPP	trace	ANL-W, NRF, PER – May be present in the debris stream. CPP – May be present in the debris stream.	ANL-W, NRF, PER - used as reactor fuel cladding material. CPP - Dissolution of zirconium and zirconium-alloy fuels performed.	ANL-W-P001, ANL-W-P002, ARA-U003, ID-P091 INTEC-P005, INTEC-P006, INTEC-U002

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
Zirconia (zirconium oxide)	RFO	trace	Present in the debris stream. May be present in the graphite stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge. B771 liquid waste to B774, 741 sludge.	In B705: used as insulation in hot-press assemblies for the pressing of refractory containers/crucibles. In B771: used as a mold coating for graphite melting crucibles and molds used in uranium-233 casting.	RF-P095, RF-P173, RF-P348, RF-P408
Zirconium boride	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Zirconium carbide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173, RF-P408
Zirconium fluoride	CFA	trace	CFA - May be present in the debris stream.	CFA - Used in the recovery of uranium from simulated fuel elements processed in CFA-674.	ARA-U003
Zirconium hydride	TAN	trace	TAN - May be present in the debris stream.	TAN - Used as a moderator in the inserts for the HTRE reactors.	TAN-P080
Zirconium metal	RFO	trace	Present in the debris stream. Present in 74A/743 sludge from machining operations.	In B444 and B447: alloyed with uranium and niobium. In B444, used in mold coating.	RF-P047, RF-P084, RF-P166, RF-P408, RF-U152
	INL	trace	INL - May be present in the debris stream.	INL - Zirconium plates, turnings, and sawdust.	
	CFA	trace	CFA - May be present in the debris stream.	CFA - Used in the clad of simulated fuel processed for uranium recovery and in the calciner at CFA-674.	
	CPP	trace	CPP - May be present in the debris stream.	CPP - Dissolution of zirconium and zirconium-alloy fuels performed. Zirconium activity removed during decontamination operations in the cells in CPP-601.	RF-U067, INTEC-P005, INTEC-P006, INTEC-U002
Zirconium nitride	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173
Zirconium oxide	RFO	trace	Present in the debris stream. B444 and B779 liquid waste to B774, 742 sludge or to the solar evaporation ponds. B771 liquid waste to B774, 741 sludge. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge.	In B444: used in mold coating. In B705: used as a spacer in hot-pressed container assemblies. In B771 and B779: used as a mold coating in the fabrication of U-233.	RF-C227, RF-P047, RF-P173, RF-P348, RF-P408, RF-U152
	ANL-W	trace	ANL-W - May be present in the debris stream.	ANL-W - Used to coat metal refining crucibles and molds and in ternary fuel. Used to remove fluoride from xenon trioxide.	ANL-W-P001, ANL-W-P002, ID-P091

Table B-1. (continued).

Chemical Constituents List	Generating Site	Amount in Waste	Wastes Flow	Buildings and Original Uses	AK Reference
	CFA, NRF, PER	trace	CFA, NRF, PER – May be present in the debris stream.	CFA, NRF, PER - Used in ternary fuel.	PER-P003, RF-U208
	CPP	trace	CPP – May be present in the debris stream.	CPP - Processed ternary fuel elements.	
	TAN	trace	TAN – May be present in the debris stream.	TAN – Used as cladding for some of the ceramic fuel elements in the inserts for the HTRE reactors.	TAN-P080
	Rockwell ATI Division	trace	ATI - May be present in the debris stream.	ATI - Used in reactor development.	ID-P091, ID-U297, ID-U298
Zirconium phosphate	ANL-W	trace	May be present in the debris stream.	ANL-W – used to remove fluoride in xenon trioxide.	RF-U208
Zirconium silicide	RFO	trace	May be present in the debris stream. B705 liquid waste was bottled and sent to B774 for processing into 742 sludge or 744 sludge and/or burial in 742 sludge.	In B705: hot-pressed into containers/crucibles.	RF-P173